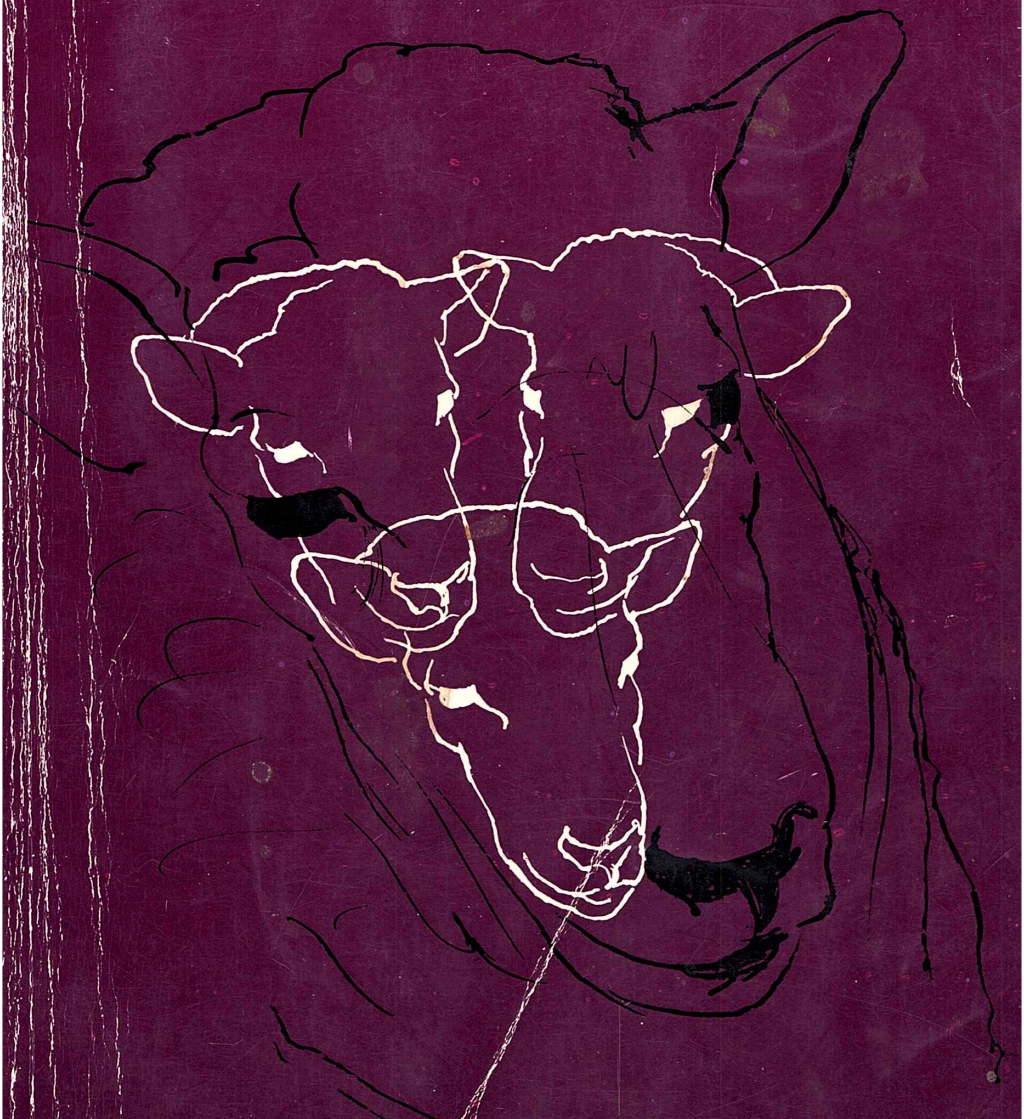
Sheepfarming Annual 1968



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SHEEPFARMING ANNUAL 1968

SHEEPFARMING ANNUAL
1968

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Editor

A. L. RAE

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DEVELOPMENTS IN AGRICULTURE PAST, PRESENT AND FUTURE

D. N. R. WEBB*

To cover this subject adequately would require a long paper, and even then it would be sketchy. I shall do no more than select highlights from history and follow on from there. It is only to be expected that any predictions will be inexact; even specialists have so often been wrong in projecting in the narrow fields of dairy and wool prices.

When one compares the performance of the early settlers with the present requirements of the developing countries for aid to establish their agricultures on a sound and productive basis, there is only one conclusion—that the New Zealand pioneers were men of resource, determination and courage. They came with meagre possessions into an unproductive and often hostile land and tamed it by effort and example to produce the democratic sanctuary enjoyed today.

There is currently much talk of New Zealand linking with Australia. It was in 1814 that New Zealand was proclaimed a dependency of New South Wales, but we quickly established our independence. One prediction I make with some conviction is that we will be continuing in that independence, and, in consequence, must continue in the development of our self reliant and pioneering traits.

The early pattern of land legislation in New Zealand was determined by Instructions issued by Queen Victoria and given effect to by the Governor. Those of 1840 authorized the survey of the Colony, the sale of land in fee simple, the making of reserves for public purposes and their vesting in trust in corporate bodies. In 1846 came the Instructions for land regisration, the sale of Crown land, the leasing of mineral lands, followed in 1849 by those for depasturing and timber licenses.

One historian writing of the times observed that the great need of the Colony was for money and population. The Government, he said, faced continuous obstacles in the shape of troubles with the inhabitants and limited funds.

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* Director-General of Agriculture.

History is either repeating itself, or, perhaps, doing no more than proceeding along the path that will always produce crises such as we have known before.

In 1793 Baron Lyttelton commented: "Our revenues mortgaged, our credit sunk, our people exhausted and dispirited."

Fifty years later, in 1849, the great Disraeli added: "In industry, commerce and agriculture there is no hope."

The Auckland Provincial Government was the first to authorize the sale of Crown land on terms—deferred payments. It also introduced the ballot, auction and homestead systems. Under the last, no payment was required, title being granted when certain minimum improvements were carried out. The Aucklanders did not neglect education. They authorized the Crown Grant of 80 acres of country land to any teachers who served a term of 5 years at a country school.

The third phase of land settlement in New Zealand may be said to have commenced with the abolition of the Provincial Governments and the passing by the Sir George Grey Ministry of the Land Act 1877 embodying to a large extent the principle of the State leasehold, while still maintaining the freehold and deferred payments systems. The legislation provided for the issue of pastoral licences over pastoral runs, still a feature of the Canterbury and Otago farming scene.

In the developing days of farming in New Zealand the Ministry of Lands was studded with many famous names—the Hon. James MacAndrew who piloted the 1877 Act; William Rolleston, who introduced the perpetual lease; John Ballance, who added the small grazing run lease—limit, 5,000 acres, term, 21 years perpetually renewable, rents fixed by auction, the lessee being entitled to exclusive pasturage of the land and to any crops he might take from it. Improvements equivalent to the value of four years' rental were to be effected within 6 years. It is recorded that the value of this form of tenure quickly became manifest because it was particularly suitable for the settlement of rough broken country where, although the soil was good, the land was too steep to cultivate and only adapted to grazing after the bush was felled and burnt and grass seed sown broadcast.

Ballance's village homestead special settlement scheme merits mention because of its similarity to schemes tried out in the Depression of the 1930s (Gordon Coates' ten-acre or "Over the Fence Scheme" as it was known), and the rural housing scheme of more recent years. The

purpose was to establish groupings of "industrious and thrifty families throughout settled districts on perpetual leases of not more than 50 acres on which they could run a cow or two, a horse, grow potatoes and garden crops to supplement their earnings from farm work. The Hon. Geo. Richardson's reign as Minister saw the introduction of a Selectors' Land Revaluation Act under which very considerable rental concessions were granted to compensate for deteriorating economic conditions.

The years 1891 to 1900 were coloured by the inspiring drive of Sir John McKenzie who wrote his closer settlement ideas into the legislation and introduced the lease in perpetuity, term 999 years. With the lease carrying a constant rent for the whole term of the lease, it is not surprising that most holders of this tenure have not availed themselves of the right of freehold written into the leases in 1946.

And so on down through the halcyon days of Lands Ministers such as the Hon. T. Y. Duncan, Sir Joseph Ward, the Rt. Hon. W. F. Massey, Dr H. Guthrie and A. D. McLeod.

While every era has taught us lessons hammered out on the anvil of experience, in my memory the greatest was that resulting from the efforts to rehabilitate the ex-servicemen of World War 1. The Discharged Soldiers' Settlement Act of 1915 inaugurated a policy that made a bold attempt to grapple with the problem of settling a large number of men in a short space of time. Approximately one-and-a-half million acres of Crown land was set aside for balloting among returned men but they could if they so desired apply for an advance up to £2,500 to purchase on the open market. Advances for development were in general limited to £500 (not more than £350 for buildings), or, in the case of bush land, not more than £1,000. Advances were available on current account for stock.

Trouble for the new settlers first arrived in 1918-9 when produce prices fell creating burdens that were impossible for men battling their way single-handed on unproductive units—in bush clearings and on tough hills.

The Settlement Scheme lived up to its name—it settled many for all time.

A 1923 survey showed that, by the modest standards of the day, 50% had managed successfully, 30½% were were temporarily unsuccessful, and 18½% were failures.

For a second time, revaluation legislation had to be enacted and the distress stories recorded in the files of the

Lands Department were not the kind of reading for the soft hearted. One had to have an exaggerated sense of humour to see the funny side of even the most humorous incidents.

There followed quickly the Big Depression which put paid to the hopes and aspirations of many of the ex-servicemen who had survived earlier difficulties and plenty of others besides.

Fortunately, light had dawned by 1929 with the realization that it was impossible for any would-be farmer with small resources to create a farm for himself, starting from scratch in the wilderness, and Parliament gave the Lands Department authority to inaugurate the land development scheme that has blossomed of recent years.

Barely was it under way when the Depression struck, but good use of it was made to provide productive work for unemployed. The camps were often dreary affairs but they did provide a sense of purpose and a hope for the few who were to be established on units as they came out of the production line.

Just back on to an even keel again, we were swept into World War 2. The land development scheme was blown up to provide units for the second crop of ex-servicemen, deflated by the shortage of fertilizer and other essentials and blown up again to greater proportions when the main stream of repatriation was under way. The success of the rehabilitation scheme has been the envy of the world but it has had its difficulties.

Advances in technology, farm and business management have kept most of the ex-servicemen settlers in a comfortable position and I use the word "comfortable" in a medical connotation—the pain is bearable with the help of a few drugs—but the size of some of the units has often been under attack. As there were in the first rehabilitation scheme, there have been amalgamations, settlers shifted to make way for an expansion of neighbouring holdings, additional land acquired by joining the whole or part of an old time marginal unit next door.

The 10,000 to 12,000 lb butterfat, or 600 to 650 ewe units, are no longer viable and as that world-wide phenomenon, the cost price squeeze, continues to work on us we will have to remain flexible in our thinking. We are more productive than many of our competitors but we cannot ignore the quiet revolutions in world agriculture.

In the United Kingdom the managers of agriculture—the British Ministry— have asked themselves the first

question that should come from any good manager, "What am I trying to do?" What they want to do, of course, is to take the strain off the Treasury, at the same time keeping the people and the farmers happy—essential aims of any politician desiring a long and peaceful life. They are changing their subsidy pattern, providing incentives in the way of annuities and grants to encourage amalgamation of units and by grants encouraging the development of co-operatives in marketing and production. The cotel is but an example—groups of farmers being encouraged by grants to give up control of their dairy herds which are amalgamated and placed under independent management, the farmers assuming the distant role of directors.

Small units in Britain are disappearing at the rate of 2,000 a year; in America, since 1959, producing farms have declined by 25% and it is estimated that another 100,000 or 3% will be absorbed in larger units in 1968.

Europe is on the same path. In France, 150,000 farm labourers a year are being re-established in other enterprises; 2,000,000 have left German agriculture in the last ten years. Peasant farming is on the way out and production is on the way up. The subsidies are still there but authorities like Dr Mansholt, Vice-President (Agriculture) in the Common Market, are convinced that they are only palliatives, and an encouragement to inefficiency as well as being a drag on national productivity.

A few figures relating to the increase in French dairy production will illustrate the results of restructuring their agriculture, and highlight the reason for the competition New Zealand is now encountering in markets other than Britain where we have quota protection for butter only.

French Dairy Exports
('000 metric tons)

	1965	*1966*	*1967*
Butter	29.8	40.3	57
Cheese	64.3	76.3	82.3
Skimmed milk powder	70.6	153.4	165.9

In the German regions, which the bulk of the 2 million farmers previously referred to have left, the male beef cattle population has risen from ¾ of a million to 2¼ million because of better management of pasture and feed supplies.

Perhaps the spur to the sharp rise in British agricultural production was given by the inimitable Winston Churchill with his words: "Fifty million people all dwelling in a

small island growing enough feed for only 30 million is a spectacle of insecurity which history has not often seen before. There is no question of choosing between food production and exports. We must have both driven forward with the fiercest energy."

More recently, the National Farmers Union of Britain, stimulated by the general wish to correct the balance of payments, has been out in front with the advocacy of more self-sufficiency. It says: "The balance of payments crisis is serious. It need not be. We still import £1,000 million worth of temperate foods every year. No other country accepts such a drain on its resources. Neither need we or should we."

It is not my purpose to create a state of despondency, or to aggravate the worries associated with the low level of wool prices and other facts of the current economic recession. All I want to do is to emphasize the point I have so often made that this is no time for complacency if there ever was such a time. New Zealand's economic history, as I have illustrated, is full of ups and downs, but where we so often fall into error is in regarding all good news as good. Too much of it is bad because it breeds a soft or easy attitude and generates financial and market carelessness.

There is still too much reliance placed by some people on the fact that we are low-cost producers, and, in consequence, ought to be accorded preference. The other 3,000 million people in the world are not persuaded to change their own economic policies to protect the welfare of 2¼ million New Zealanders. One Frenchman, speaking a couple of years ago at an IFAP meeting at Rotorua, spoke words which I have not forgotten. Replying to a New Zealand delegate's argument that freedom of access should be allowed everywhere for our low-cost farm products, he said: "I can read statistics as well as you can. Your farmers are better off than ours. We are like any person renovating his house. He welcomes visitors only when the job is finished. We are reconstructing our agriculture. When we finish we might invite you in."

One American cattleman recently in New Zealand on tour argued strongly that we are a threat to the American beef industry. When he reached home, he was surely putting the pressure on to impress this fact on his politicians.

Dr Austin Mitchell observed in an article in the *Dominion* (May 18, 1968), that leaving New Zealand was a heartrending experience—all the sadder because, mind

filled with New Zealand images, you go out into a world which is completely indifferent.

We must recognize our problem and do something about it. The fact that every year there are so many extra mouths to feed should give us faith in the future as should the fact that we have overcome many worse difficulties in our short history.

And to do something about it, we must improve farm management to win maximum returns from our resources, and management means change. The first need of a good manager is to adapt to change, indeed to stimulate change. There is no doubt that everyone desires more money in their pockets, but what must be realized is that we all have to do something about it. It is well known that:

Much can be done to improve the wool clip, and, frankly, there is no merit in arguing that the poorer presented wool brings just as much as the better. The poorer is dragging down the better.

Carcass bruising and hide damage can be eliminated quite cheaply. The cost is care.

Much can be done to limit the spread of animal diseases through improved water supplies, more hygienic yards and shearing sheds.

The profitability of cash inputs can be improved through wiser financing, budgeting and control of cash flow.

The presentation of our product can be improved.

Transport, handling, and marketing of our products can be improved.

But we must want to do these things, and that means we must develop the habit of asking ourselves vital questions and take a lot of trouble about the answers.

We must find these answers ourselves, and have sufficient energy and drive to put them into effect—if we are convinced and have convinced others that the answers are right.

It is no use complaining to one's neighbours—better to listen to them, for they might have ideas that are an improvement on one's own.

It is no use complaining about Government. It comprises the people's elected representatives and reflects the people's combined views.

We must implant three questions in our minds: What am I trying to do? What is stopping me from doing it? What can I do about it?

To conclude, I shall make a few general observations.

Throughout our history, we have had to face and overcome problems of one kind or another.

The earliest problems of security of tenure and adequate finance for development have been overcome.

Technology has advanced in keeping with the demands of the day and is adequate to enable production to be lifted to a high level.

Advisory services, although rather thinly spread, are not sufficiently understood and appreciated. They are frequently ignored. A recent farm survey in the South Island disclosed that 25% of the farmers interviewed required nothing more in the way of incentives to persuade them to reach the full potential of their properties. They dismissed the commonly-quoted disincentives—income tax, labour, finance, stable prices, farm machinery, death duties. The greater the differences between the level of aspirations and achievement the greater was the dissatisfaction. In answer to the question, "Would you change your present management if the change meant that, for a little extra work, you could get more net profit and a more valuable asset?" Fifty-seven per cent in one group and 27% in another answered "No."

The keys to progress are attitudes—towards finance, budgeting, recording, advisory and technical servicing, the demands of the consumer, and management. On attitudes I quote Edmund Burke: "A State without the means of some change is without the means of its own conservation."

Good management ensures most effective and profitable use of all resources to enable the operator to absorb the shocks of variation in seasons' fluctuations in prices.

Management involves constant questioning or examination of one's own performance.

FUNGICIDES AND THE CONTROL OF *PITHOMYCES CHARTARUM*

J. N. PARLE AND MARGARET E. DI MENNA*

AT the 1967 Ruakura Farmers' Conference, Sinclair and and Parle (1967) reported on preliminary field trials with thiabendazole against the fungus *Pithomyces chartarum*, causative agent of facial eczema. The results of those trials refocused interest on the control of facial eczema by fungicides and laboratory work was begun to evaluate other compounds. A number of fungicides which had been field tested previously without success were re-examined in laboratory trials in which their activity against *P. chartarum* was measured. At the same time new materials obtained from a number of chemical firms were tested. To do this, several strains of *P. chartarum* were grown on a series of media containing measured amounts of fungicide and the level at which fungal growth was completely inhibited after ten days' incubation was determined.

Table 1 shows some of the results obtained in this work.

TABLE 1

Fungicide	*Field Test*	*Lab. Activity in ppm*
Ferbam	Not tested	
Maneb	No control	>1000
Thiram	No control	
Dichlone	No control	
Dichlorophen	No control	1000
Oleocop	No control	
Phenyl mercuric acetate	No control	5
Euparen	Not tested	3
Omadine	Not tested	3
Fuberidazol	Not tested	0.6
Benlate	Not tested	0.2
Thiabendazole	Control	0.2
Benzathiadiazoles*	Not tested	0.2 – 0.6

*The benzathiadiazoles are not commercially available and only 50 mg was available for laboratory testing.

*Ruakura Agricultural Research Centre, Hamilton.

In laboratory tests, many of the materials previously used in field trials had very low levels of activity compared with thiabendazole. From these data it was concluded that for a fungicide to have any prospect of giving useful control in the field it should prevent the growth of *P. chartarum* in laboratory tests at a level not greater than 3 ppm. Experience with fungicides in plant disease control and results from a plot trial conducted last year (Sinclair and Parle, 1967) had also suggested that for field control of *P. chartarum* insoluble materials would be of greater value than soluble fungicides which could be readily lost by leaching.

FIELD TRIALS

All the work described here was done on small plots 20 yd × 1 yd and results were assessed by changes in spore numbers obtained from twice weekly spore trappings throughout the season.

All fungicides tested were suspended in water to give an application rate of 40 gal per acre and spraying was done with the Oxford Precision Sprayer. Each treatment was replicated three times and all of the 200 plots at Ruakura were set out in one field. The area was grazed by sheep in a normal farm rotation, and, except that no grazing was allowed for at least a week after any spraying, no attempt was made to influence the fungicides by manipulating stocking on the trial area.

In the first experiment, a comparison was made between fungicides at rates of from 1 oz to 10 lb active ingredient (a.i.) per acre. Five materials, thiabendazole, Benlate (formerly designated Du Point 1991), Fuberidazol, Euparen, and Zinc Omadine were tested and results from four of these trials are shown in Fig. 1. These response curves were obtained by expressing the spore counts on treated plots as a percentage of the counts on control plots on a given day.

Both thiabendazole and Benlate showed a high degree of activity in the field. On the basis of the figures here, there seems to be little advantage in using more than 4 oz a.i. per acre of these fungicides.

Euparen, active at 3 ppm in the laboratory, has very much less activity than either thiabendazole or Benlate. This was confirmed on trials laid down at Tauranga. Helensville and Dargaville and by D. P. Sinclair of Manutuke where Euparen was even less effective in reducing spore numbers. Similar results were obtained in trials with

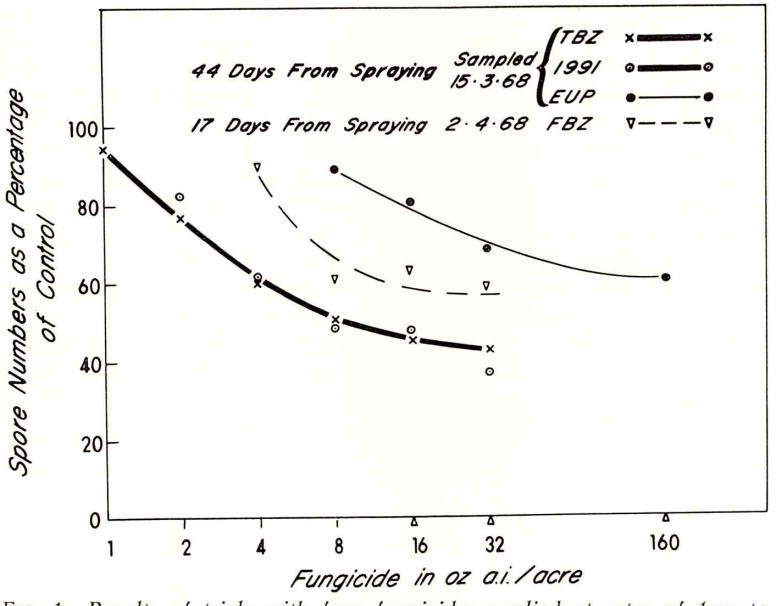


FIG. 1: *Results of trials with four fungicides applied at rates of 1 oz to 10 lb a.i. per acre.*

Zinc Omadine which had similar activity in laboratory tests.

Fuberidazol is a newer fungicide, chemically closely related to thiabendazole and Benlate, and although in laboratory test it was less effective than thiabendazole it had promising activity in the field. It was not received until mid-March and therefore could not be field tested until spore numbers were very high. Because of this, further work will be necessary to compare the activity of Fuberidazol with the other benzimidazole fungicides.

An experiment designed to examine the effect of time of spraying with thiabendazole (1 lb a.i. per acre), on the subsequent pattern of *P. chartarum* growth was begun on November 24 and further trials were laid down on December 19, January 25 and February 26. All plots were spore trapped twice weekly for 2 to 3 months after laying down.

Results from the November spraying are given in Fig. 2. Spore numbers were very low during the early part of the season and control was achieved for about two months after spraying but had broken down in late January when numbers rose to about 4,000 spores per cu. ft. A similar pattern occurred with both December and January

sprayings. Again, spore numbers remained low and control lasted for six to seven weeks. Fungicide applied on February 26 (Fig. 3) gave good control for the remainder of the season even though spore numbers rose to very high levels. It is important to note that under our conditions where spore numbers were reduced by 80% in this trial, there were still almost 20,000 spores per cu. ft on the sprayed plots. This would suggest that, when choosing areas to be sprayed, exposed paddocks where spore numbers are likely to be lowest should be selected. It is not expected that complete control of an organism can be achieved under field conditions with any fungicide spray. This is particularly true in the use of sprays to prevent outbreaks of facial eczema. A balance must be reached between the cost of spraying and the level of control required. Work carried out so far indicates that:

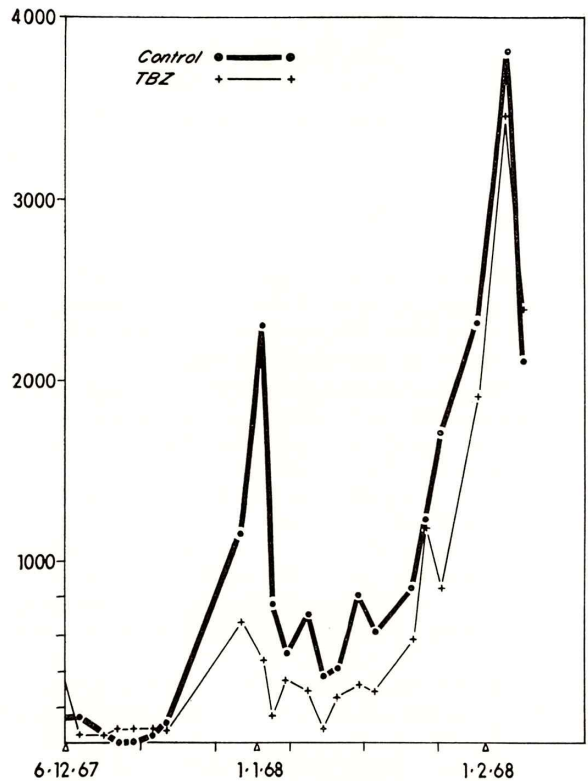


FIG. 2: *Thiabendazole trial. Sprayed November 24, 1967, at 1 lb a.i. per acre.*

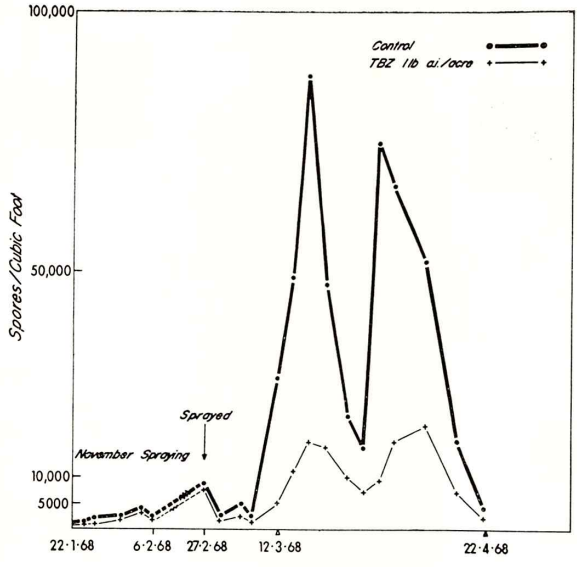


FIG. 3: *Thiabendazole trial. Sprayed February 26, 1968.*

(1) Rates of thiabendazole or Benlate as low as 4 oz a.i. per acre should give adequate control of the fungus.

(2) No advantage can be gained by very early spraying. In most districts where facial eczema is a problem, application should be delayed until the end of January with a second application in early March.

(3) When selecting paddocks to be sprayed, exposed sites are likely to be the most satisfactory.

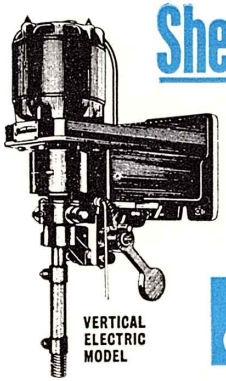
ACKNOWLEDGEMENTS

Thanks are due to the following companies for providing the chemicals used in this work: Merck Sharp and Dohme Ltd., U.S.A., via Merck Sharp and Dohme N.Z. Ltd. (thiabendazole); E. I. Du Pont de Nemour, U.S.A., via Neill Cropper N.Z. Ltd. (Benlate); Bayer Co. Ltd.; Germany, via Henry H. York and Co. Ltd. (Euparen and Fuberidazol); E. R. Squibb and Sons N.Z. Ltd. (Zinc Omadine); British Drug Houses N.Z. Ltd. (dichlorophen); N. V. Philips-Duphar, Netherlands (benzathiadiazoles).

REFERENCE

Sinclair, D. P.; Parle, J. N., (1967): Thiabendazole and facial eczema. *Proc. Ruakura Fmrs' Conf.*, pp. 160-70.

Sheepfarmers . . .



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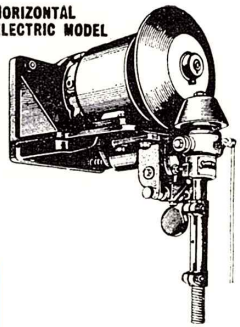
HORIZONTAL ELECTRIC MODEL



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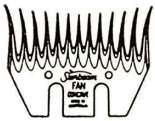

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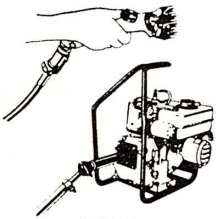

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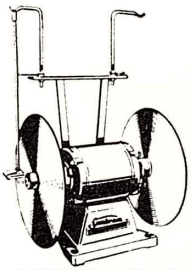

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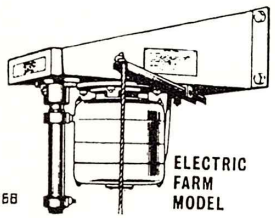

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CONTROL OF FACIAL ECZEMA IN LAMBS BY THE USE OF FUNGICIDES

A. G. CAMPBELL* and D. P. SINCLAIR†

THE discovery by Sinclair and Howe (1968) that the common anthelmintic thiabendazole gave long-term control, in the field, of the causal fungus of facial eczema (*Pithomyces chartarum*) has opened a new line of attack upon the disease.

Laboratory screening of allied chemicals led to the finding, in late 1967, of another fungicide which looked promising. Since this material, known then as Du Pont 1991, and subsequently designated "Benlate", was expected to be less expensive than thiabendazole, it was decided to compare these materials for efficacy in controlling the disease in stock. At the same time, the cost of all such materials is so high that it seemed important to try to find a minimum effective level at which they would control facial eczema.

EXPERIMENTAL

These considerations led to the main 1968 animal trial which was replicated at Kaitaia, Dargaville, Helensville, Ruakura, Katikati, and Manutuke. At each site, 8 × ½ acre plots were prepared and the following rates of active ingredient (a.i.) per acre of each material were applied: 0 (control), 4 oz, 8 oz, 16 oz. At Manutuke, the plots were sprayed at the third danger period on January 27, 1968, but at the other five sites conditions did not become dangerous until much later. These other areas were all sprayed in the week beginning March 11, 1968, using the farmer's own, or other locally available boom spraying equipment. The fungicides were applied in 80 gal of water per acre through large fan jets (usually 0.46 mm) with the filter gauzes removed.

After application, the fungicide materials were allowed 7 to 10 days to take effect before the test lambs, known to be free from facial eczema, were distributed. At all centres, ten lambs were admitted to each ½ acre plot, except at Manutuke where only eight lambs per plot were used. These lambs were then set-stocked for approximately six weeks in the case of five trials, but for almost 12 weeks in the case of the Manutuke trial. The lambs were then returned to Ruakura and held on crop or safe

*Ruakura Agricultural Research Centre, Hamilton.
†Manutuke Agricultural Research Station, Gisborne.

pasture for two weeks prior to slaughter, to allow any late intake of the fungal toxin time to produce the characteristic liver lesions.

At most of the outside trial centres it was possible to take only occasional counts of the spores of *Pithomyces chartarum*. At Manutuke, however, spore counts were made regularly.

RESULTS

Spore Counts

These are of interest mainly in showing the general level of spores at the time of applying the fungicides. At Manutuke, spores were very low (a few hundred per cubic foot of air passing through the spore trapping instrument) when spraying was carried out. At Helensville and Ruakura they were also quite low—in the range of from 2,000 to 4,000 spores per cu. ft of air. At Kaitaia they were moderately high—round the 40,000 cu. ft mark, and at Dargaville and Katikati counts were very high—about 150,000 per cu. ft. Spores did not build up to high levels even on untreated plots at Helensville and Ruakura. Spore numbers declined quite steadily at Kaitaia and this may have been due to the very wet, cyclonic weather conditions which at one stage had the trial area completely under water for the best part of one day. At Dargaville and Katikati spore counts stayed high and although they may have been slightly higher on the untreated, control plots they were still well over 100,000 on some fungicide sprayed plots three weeks after spraying. There was little evidence of any general reduction in spore numbers by fungicide treatment in these two trials. At Manutuke, where spraying was carried out and the lambs admitted in late January, when spore counts were still low, spraying effected good control of the fungus. On the control plots, spores reached 30,000 to 70,000 per cu. ft of air by mid-March, whereas most sprayed plots were below 10,000 at this time, although there was evidence that the lower rates of the fungicides were losing their effectiveness.

Lamb Liver Damage

The criterion employed to judge the effectiveness of the treatments, so far as animals are concerned, is the state of their livers at slaughter. The livers from these trial lambs were graded for damage by the fungal toxin by P. H. Mortimer, Veterinary Pathologist at Ruakura. Each

liver was dissected, examined externally and internally for evidence of damage, and allocated to one of six categories ranging from 0 to 5.

A liver graded 0 shows no sign of damage. Grade 1 indicates mild injury of no clinical significance to the animal. A proportion of these livers might even escape detection at the works. Grade 2 denotes a more severe form of injury, but a lamb with a liver in this category will not show clinical signs of the disease. It may lose some condition at the time of the outbreak, but the liver will eventually repair to allow the animal to lead a fully productive life. Grade 3 denotes marked liver injury which would be associated with loss of condition and, in some cases, with clinical disease. Most of these animals would survive, but many would constitute a risk in subsequent production. From the farmer's point of view, Grade 3 can be considered the first of the commercially-important categories. Grade 4 denotes severe liver injury, associated with marked loss of condition, severe facial lesions and some deaths. Survivors in this category would be very liable to be unthrifty and die under stress later on. Grade 5 represents acute, fatal forms of the disease and is rare.

A breakdown of these liver gradings for the Katikati trial is shown in Table 1. It is clear that the number of lambs with unaffected livers is much higher on treated pasture than on untreated pasture. Fungicide treatments, however, did not eliminate all liver damage, although what damage there was was slight and of little commercial importance. Lambs with commercially-significant liver damage were found in one control group. The final

TABLE 1: NUMBER OF LAMBS IN EACH LIVER GRADE CATEORY: KATIKATI

Fungicide Treatment (a.i./acre)	*Liver Grade*						*Total Score*
	0	*1*	*2*	*3*	*4*	*5*	
Control	3	2	5				12
Control	0	3	4	2	1		21
Thiabendazole:							
4 oz	7	2	1				4
8 oz	8	2					2
16 oz	6	2	2				6
Benlate:							
4 oz	5	5					5
8 oz	5	3	2				7
16 oz	9	1					1

TABLE 2: TOTAL LIVER DAMAGE SCORES

Fungicide Treatment (a.i./acre)	*Manutuke*	*Katikati*	*Dargaville*	*Ruakura*	*Kaitaia**	*Helensville*	*Grand Total Score*
Control	26	12	25	5	6	0	74
Control	20	21	22	5	10	0	78
Thiabendazole:							
4 oz	8	4	6	5	8	0	31
8 oz	1	2	6	1	6	0	16
16 oz	2	6	6	1	0	0	15
Benlate:							
4 oz	6	5	10	6	6	0	33
8 oz	6	7	7	3	4	1	28
16 oz	0	1	9	5	7	0	22
Spore Counts†							
At spraying	VL	VH	VH	L	M	L	
At maximum (on controls)	H	VH	VH	M	H	L	

*Trial flooded.

†L = Low; M = Medium; H = High.

column of the table presents a total liver damage score for each treatment. This is obtained by multiplying the liver grade by the number of animals in that grade and adding together all such products within each treatment. Comparing the treatments on this basis it will be seen that, on average, total liver damage has been reduced on the fungicide-treated polts to about one quarter of what it was on the controls.

There seems little to choose between the two fungicides employed, and there is not much evidence of a graduated response to level of fungicide.

Table 2 shows the total liver damage score for each of the trial sites. The effect of the fungicide treatments is clearcut at Manutuke, Katikati and Dargaville, where the incidence of liver damage in the control lambs was quite high. Where spore counts did not reach very high levels, as at Ruakura and Kaitaia, there was not much difference between the lambs on the control and the treated plots. At Helensville, there was no facial eczema worth mentioning. The final column in this table shows that the fungicide treatments, as a whole, brought about a three-fold reduction in the amount of liver damage in the test lambs. This final column may suggest that thiabendazole was slightly more effective than Benlate and that higher rates were more effective than lower rates, but any such differences are so erratic from site to site that no real practical significance should be attached to them.

Table 3 is of the same type as Table 1, but in it all six centres are combined. It needs little comment except to draw attention to the final column in which the grand

TABLE 3: NUMBER OF LAMBS IN EACH LIVER GRADE CATEGORY—ALL CENTRES COMBINED

Fungicide Treatment (a.i./acre)	*Liver Grade* 0	1	2	3	4	5	*Total "All in"*	*Score Omit Grades 1 & 2*
Control	26	6	14	8	4	—	74	40
Control	22	13	8	11	4	—	78	49
Thiabendazole:								
4 oz	34	17	7	—	—	—	31	0
8 oz	45	11	1	1	—	—	16	3
16 oz	47	8	2	1	—	—	15	3
Benlate:								
4 oz	31	21	6	—	—	—	33	0
8 oz	33	22	3	—	—	—	28	0
16 oz	43	10	3	2	—	—	22	6

total liver damage score has been modified to exclude all animals in liver-damage Grades 1 and 2—the commercially insignificant grades. What is left, in Grades 3 and above, is what the farmer has to worry about. The large effect of fungicide spraying on the commercially-important eczema is made quite clear by this treatment of the data. It is interesting that the four animals with Grade 3 livers in the fungicide-treated group were all at one trial site where the plots were long and narrow, so that adjacent treatments had a long common boundary. The affected animals were all on sprayed plots adjacent to control plots in which some clinical facial eczema occured. It is at least possible that they did some of their grazing through the fence.

Table 4 summarizes the important outcome of this trial. Of the 33% of damaged livers in the test lambs on the

TABLE 4: SUMMARY

	Fungicide Treated	*Control Untreated*
% Clean livers	67	41
% F.E. livers	33	59
% 1 + livers	25.6	16.4
% 2 + livers	6.3	19.0
% 3 + or > livers	1.1	23.3

fungicide-treated plots, all but 7% had negligible damage and only 1% had damage likely to affect the future production of the lamb. Fifty-nine per cent of lambs were affected in the control groups and 23% had commercially-serious liver damage.

CONCLUSION

The results of this series of trials suggest that it is possible to control almost completely the more serious manifestations of facial eczema in lambs by the use of these fungicides.

They are probably most effective when applied early, before spore build-up begins (as at Manutuke), but they can effect good control of the disease even if applied when spore counts are already high (as at Katikati and Dargaville) although in such cases some other precaution, such as shutting up and feeding hay, would be needed for the first 7 to 10 days after spraying, to allow the fungicide time to act.

In farm practice, 4 oz of the active ingredient of thiabendazole should be used. This is contained in 5⅓ oz of

commercial (75% active) powder. Thus, 1 lb of commercial powder will treat 3 acres, at a cost of $4.17 an acre for material.* If Benlate is cheaper per unit of active ingredient when it becomes commercially available, it would seem likely to replace thiabendazole at its current price.

The problem remains of how to use these materials on a farm scale. At present, it is recommended that if two danger periods have been recorded (using the Facial Eczema Predictor) by the end of January, an area should be sprayed early in February large enough to hold for 7 to 10 days the stock which it is wished to protect. At the third danger period the stock should be grazed across this area and further areas sprayed to carry the stock when the treated pasture runs out. In some areas, *e.g.*, Gisborne, it appears to be safe to spray with fungicide at the third danger period and to use the resultant safe feed from the fourth danger period onwards. Judicious use may be made of conserved fodders such as silage and hay to extend the useful life of the sprayed pasture and still maintain production in dairy herds.

The history of the duration of facial eczema danger periods in a district may suggest that it is a reasonable risk to spray a smaller area, but if this risk is taken the consequences of mistaken judgement must also be accepted. Finally, after a period of regrowth, the sprayed pasture should continue to be relatively safe for subsequent grazing up to six weeks from the time of first spraying and possibly longer in dry weather.

ACKNOWLEDGEMENTS

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REFERENCE

Sinclair, D. P.; Howe, M. W., 1968: *N.Z. J. agric. Res., 11:* 59-62.

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* A new formulation of thiabendazole, specially prepared for pasture spraying, has now (August, 1968) been produced. This material contains only 60% of active ingredient and it will take 7 oz of this powder per acre to provide 4 oz active ingredient per acre.

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FACIAL ECZEMA AND GRAZING MANAGEMENT

J. A. LANCASHIRE and R. G. KEOGH*

INTRODUCTION

THE purpose of this paper is to demonstrate that simple variations in grazing management can reduce the incidence of facial eczema. These management techniques are concerned with dead matter build-up in pastures, the botanical composition of pastures, and the intake of herbage and spores of *Pithomyces chartarum* by the grazing sheep. Although we cannot present a recipe for the 100% elimination of facial eczema, we can indicate possible techniques which are completely under the farmer's control, are easily carried out, and cost virtually nothing.

BACKGROUND

Although most farmers are probably well aware of the cause of facial eczema, the climatic conditions which accompany an outbreak of the disease, and the kind of precautions that can be taken, there is a need for reiteration of some aspects of the disease in order to have a clear picture of what happens.

In most parts of New Zealand the disease occurs only infrequently, and even in so-called bad years, outbreaks are often sporadic rather than general. From comments published in the Department of Agriculture's Annual Report it appears that widespread facial eczema occurs in approximately one out of five to six years in the Manawatu area, one year in three to four years in the Waikato, and possibly more frequently in specific areas like Gisborne or the sand country near Dargaville. However, such averages can be misleading, as has been illustrated by the elapse of 12 years between the two most recent bad outbreaks in the Manawatu in 1956 and 1968. These variations pinpoint a major problem in facial eczema control, for, with intervals of possibly 3 to 10 years between outbreaks, not only is there some turnover in the farming population, but also established farmers tend to forget to take suitable precautions against the disease. In fact, an investigation of the mass of exaggerated statements and mumbo-jumbo that tend to surround facial eczema

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suggests that if stock deaths and production losses from the disease were calculated on an annual basis the problem nationally would be a relatively minor one. It is also important that the 1938 outbreak, often quoted as an example of what might happen again, occurred when there was almost complete ignorance of the disease. With present knowledge, it is unlikely that such a situation will arise in the future.

However, an actual outbreak of facial eczema on a farm still presents a very unpredictable situation. For instance, by the time clinical symptoms become apparent the flock has already been exposed to dangerous pasture several days earlier. Further, it may not be until the following winter or spring, when animals are under stress through feed shortages or pregnancy, that some animals first show obvious signs of having contracted liver damage the previous autumn. Most farmers are aware that some paddocks, particularly those likely to dry out in the summer, are prone to produce eczema. However, even within a paddock, the patchy distribution of the fungus and selective grazing by individual sheep may lead to a wide range in severity of the disease within a flock.

Notwithstanding these variations, it is clear that conditions favourable for the growth of the fungus can be predicted from climatic data. This fact, combined with spore counts in each district, forms the basis of the warning system which is vital to all control techniques. Only fairly generalized warnings can be given, however, and, following these, many farms avoid eczema fortuitously through factors like management, paddock aspect, or stocking rate. On the other hand, farmers may increase their susceptibility to the problem by, for example, frequent topping of paddocks during the summer which probably guarantees some facial eczema in the autumn almost regardless of climatic conditions. Some years ago Mitchell *et al.* (1959) proposed an early warning system based on the fact that weather conditions in November and December could be a fairly reliable guide to the likelihood of outbreaks later in the season. The wider use of this method could help farmers materially in forward planning of methods for eczema control. However, all warning systems are dogged by the fact that climate is still unpredictable and thus a warning may become obsolete through a rapid change in weather conditions. These real problems mean that facial eczema advisory committees have an extremely difficult job. It should also be noted that for the most economical use of the new spray-

ing techniques the farmer is still very dependent on an accurate warning system. In addition, it is important to realize that, unlike bloat, pastures are not immediately made safe by spraying.

Clearly, the control of facial eczema is very dependent on the quality of the farmer and the information he has available. In the remainder of this paper some data will be presented which could help him in this task.

PASTURE COMPOSITION

As *P. chartarum* lives on dead plant material only, the factors which affect the quantity and quality of this pasture component are of great importance. Some dead material is present in pasture at all times of the year but it is generally at a peak in late summer presumably as a result of water shortage. The actual quantity of dead material may be affected by innumerable factors and only a few of these will be considered here. Clearly, if pasture is regularly irrigated throughout the summer, a considerable improvement in growth and a reduction in the quantity of dead material may be achieved. However, a word of warning is required here because it is highly probable that intermittent watering could produce a very dangerous eczema situation, whereas adjacent unwatered areas may be free of the disease. It has been emphasized many times that pasture topping is dangerous. There is no better method of producing eczema every year than a policy which leaves large amounts of topped grass on the paddock. The growth and performance of the main species in the sward during the drier period of the year is also important. Table 1 shows that 'Grasslands Ariki' ryegrass is superior to 'Grasslands Ruanui' perennial rye-

TABLE 1: YIELD OF LIVE AND DEAD RYEGRASS IN TWO ROTATIONALLY GRAZED RYEGRASS/WHITE CLOVER PASTURES AT FOUR SAMPLING DATES

(lb per acre to ground level)

	Jan. 11	*Jan. 27*	*Feb. 8*	*Feb. 25*
LIVE				
Ruanui	970	797	230	509
Ariki	1,171	1,622	758	1,171
DEAD				
Ruanui	1,104	1,287	1,516	1,431
Ariki	700	873	1,267	960

TABLE 2: THE EFFECT OF CROWN RUST ON THE YIELD OF TWO RYEGRASS VARIETIES

(lb per acre to ground level)

	Green	*Yellow*	*Brown*
RUANUI			
Low rust level	1,612	140	568
High rust level	757	310	955
	—53%	+121%	+68%
ARIKI			
Low rust level	1,769	185	650
High rust level	1,400	196	826
	—21%	+6%	+27%

TABLE 3: PERCENTAGE INTAKE OF HERBAGE COMPONENTS BY GRAZING SHEEP AT TWO PASTURE HEIGHTS

	3 to 4 in.	*1 to 2 in.*
Live ryegrass	41	30
Live white clover leaf and petiole	44	14
Live white clover stolon	0	18
Dead ryegrass leaf and sheath	13	34
Dead ryegrass flower stem	1	3
Other species	1	1

TABLE 4: THE EFFECT OF GRAZING ON PASTURE COMPOSITION

(lb per acre above one inch)

	Day 1	*Day 3*	*Day 4*
Ryegrass	595	125	29
	(63%)	(81%)	(100%)
White clover	346	29	0
	(37%)	(19%)	
Pasture height (in.)	5 - 6	2 - 3	1 - 2

TABLE 5: YIELDS OF LIVE AND DEAD HERBAGE IN A ROTATIONALLY GRAZED RUANUI RYEGRASS/WHITE CLOVER PASTURE

(lb per acre to ground level)

	Jan. 11		*Feb. 8*	
	Ryegrass	*Clover*	*Ryegrass*	*Clover*
Live	970	845	230	432
Dead leaf and sheath	950	29	1,334	38
Dead flower stem	154	0	182	10

grass in this respect. While resistance to moisture stress undoubtedly plays a part in these differences, the data in Table 2 indicate that a variable response to the disease crown rust may be more important.

Hard grazing during the summer will reduce the amount of dead material in a pasture. In fact Brook and Mutch (1964) showed at Dargaville that sheep grazed at 10 per acre throughout the summer and autumn had less facial eczema than those stocked at 5 per acre. However, some disease still occurred in the heavily-stocked group and animal thrift was considerably reduced by lack of feed.

Another disadvantage of hard summer grazing is its adverse effect on the persistency and production of ryegrass (Brougham, 1960). In addition, white clover may be similarly affected through the removal of stolons by close grazing sheep (see Table 3).

Another factor that may reduce white clover growth in the summer is the preference for this species shown by grazing sheep (see Table 4).

As a result of these and other factors like moisture conservation, pastures which are spelled during the summer usually show very good growth of white clover. This is important because it has been known for many years that pure stands of white clover are relatively safe during outbreaks of facial eczema. The data in Table 5 show that one possible reason for this is that very little dead clover occurs in grazed pastures. It also shows that the vast majority of dead material in the pasture is dead grass, leaf and sheath.

Thus, summer spelling of pasture with a reasonable proportion of clover in it should produce a long nutritious feed by the time facial eczema becomes likely in the early autumn.

LENGTH OF PASTURE

There are other possibly more important advantages of spelled pasture during a facial eczema outbreak. Most of the dead plant material is usually found in the lower parts of the pasture, and as *P. chartarum* grows only on this herbage component, the spores of the fungus are usually also concentrated in these lower regions. Results obtained this year illustrate how these factors affect spore and herbage intake by the grazing sheep.

A group of oesophageal fistulated sheep were grazed on three successive days on a spelled Ariki ryegrass/white clover pasture in early April. The herbage composition of the pasture on offer to the sheep is shown in Table 6.

TABLE 6: HERBAGE COMPOSITION AT DIFFERENT HEIGHTS IN THE PASTURE IMMEDIATELY PRIOR TO GRAZING

(lb per acre)

	Live	*Dead*	*Pasture Height*
		April 2	
Above 3 in.	580	79	
1 to 3 in.	819	323	4-5 in.
Below 1 in.	1,335	1,114	
Total	2,734	1,516	
		April 3	
Above 1 in.	353	103	
Below 1 in.	1,313	1,090	1-2 in.
Total	1,666	1,193	
		April 4	
Above 1 in.	39	23	
Below 1 in.	975	788	1 in.
Total	1,014	811	

As the pasture was grazed down during the three days, the upper layers, with a high proportion of the green plant material, were removed first. Thus, by the third day, the animals were faced with a pasture containing almost 50% dead plant material. Similarly spores became more accessible as the pasture was grazed down (Table 7).

Not only were the greatest number of spores at the base of the pasture, but both live and dead material showed a reduced spore load higher up the profile.

TABLE 7: SPORE NUMBERS AT DIFFERENT HEIGHTS IN THE PASTURE

(Per gram dry weight of herbage)

	All Herbage		
	0 to 1 in.	*1 to 3 in.*	*Above 3 in.*
April 2	300,000	140,000	40,000
April 3	330,000	110,000	
April 4	230,000	90,000	

	Herbage Components		
	Dead Leaf and Sheath		*Live Leaf*
	0 to 1 in.	*Above 1 in.*	*Above 3 in.*
April 2	530,000	350,000	30,000
			Above 1 in.
April 3	850,000	250,000	50,000
April 4	320,000		

The changes in intake by the sheep during the three days are shown in Table 8.

TABLE 8: INTAKE OF SPORES (PER GRAM DRY WEIGHT OF HERBAGE) AND PERCENTAGE OF DEAD HERBAGE

	Spores	*% Dead Herbage*
April 2	48,000	5
April 3	112,000	19
April 4	154,000	27

These results show that lax grazing of pastures may considerably reduce spore intake and thus the incidence of facial eczema. They also show that, under close grazing, sheep will eat considerable quantities of dead plant material, a factor which may be of great importance in the occurrence of the disease.

CONCLUSIONS

It is clear that grazing management may be a useful tool in the control of facial eczema. Application of these results is largely over to the individual farmer, but some suggestions can be made. The pastures chosen for spelling should be closed in early January and should be of good fertility and clover content, and located on the wetter part of the farm. During danger periods the pasture should be laxly grazed in breaks by means of an electric fence and it is essential that a back fence is used to prevent grazing on the shorter previously defoliated areas. It may also be an advantage to limit grazing to 3 to 4 hours per day and then return the sheep to a sacrifice area.

In essence, these grazing management techniques should give the farmer greater flexibility at a difficult period of the year. They are relatively simple and cheap, and provide feed of good nutritive value at tupping time. If they are used sensibly in conjunction with pasture spraying and sacrifice areas, facial eczema should become a thing of the past.

REFERENCES

Brook, P. J.; Mutch, G. V., 1964: *N.Z. J. agric. Res., 7:* 138-45.
Brougham, R. W., 1960: *N.Z. J. agric. Res, 3:* 125-36.
Mitchell, K. J.; Walshe, T. O.; Robertson, N. G., 1959: *N.Z. J. agric. Res., 2:* 584-604.

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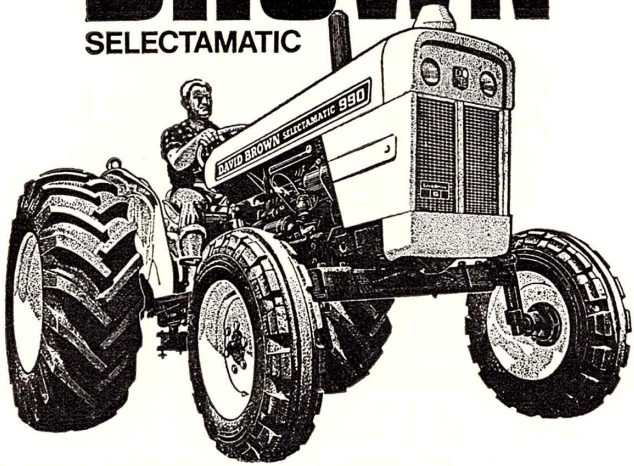

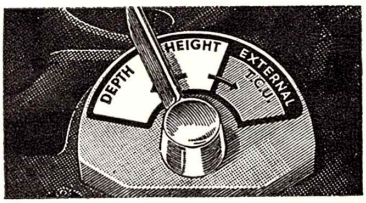

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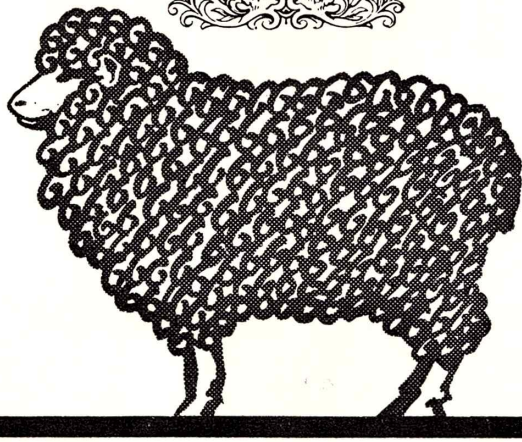

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BREEDS OF SIRE FOR EXPORT LAMB PRODUCTION

A. H. KIRTON, A. H. CARTER, J. N. CLARKE,
D. P. SINCLAIR and K. E. JURY*

AN attempt will be made in this discussion to cover some of the merits and disadvantages of different breeds of sire for export lamb production in the light of current market requirements. The problem will be considered from the point of view of the specialist export lamb farmer. A different set of factors would have to be taken into account if production of wool or surplus female breeding stock were a major consideration as on most sheep farms producing store lambs for sale.

MARKET REQUIREMENTS AND TRENDS

The "best" type of carcass to produce is presumably indicated to the farmer by the returns he receives from the sale of lambs on the local market, by the export schedule prices, or, if the farmer does not believe that the export schedule is a fair price, by the return he receives through sale of lambs on owner's account. One particular type of lamb carcass is not necessarily best for all markets. Information on the type of carcass required overseas comes from two main sources:

(1) Prices received from the sale of carcasses overseas. Until the present season, when the North Island Prime Down Cross (Down) and Prime Crossbred (Prime) grades were amalgamated, it was well known that the Down and Prime grade lambs have been receiving exactly the same price on the export schedule and on the Smithfield market indicating no market preference for either type. The leaner Y grade lambs have, in some seasons and some parts of some seasons, been fetching a premium and in other seasons (such as the present one for lower weight Ys) and in parts of seasons they have fetched a lower price. A new leggy grade, called the Omega, has been instituted this current season and carcasses in this grade receive a lower price on schedule than Prime or Y grade lambs. Little overseas market information is available on this grade. The very lean and mainly underweight Alpha grade receives a lower price than the Omega, and the Overfat grade receives the lowest price of all.

* Ruakura Agricultural Research Centre, Hamilton.

The gradings show that the market will pay no premium for conformation as was differentiated by the old Down and Prime grades, that there may be some discrimination against the very leggy lamb such as is found in the Omega grade (a type of lamb found mainly in the South Island), that in some years the lean lamb (Y grade) fetches a premium and in other years a discount, and there is very marked discrimination against the overfat lamb.

(2) The Meat Export Grades Investigation Committee Report. In 1964, the New Zealand Meat Producers Board set up a committee to investigate all aspects of the export grading system. The report, which was published in 1965, showed that the Down type carcass had fallen into disrepute owing to past experience of excessively fat carcasses in this grade. Many British butchers would not touch this grade and self service stores (where the cut surface of the meat is on display) would not consider buying the Down grade. For these reasons, the Grades Committee recommended the abolition of the Down grade and the inclusion of the Down carcasses in the Prime grade. The Meat Export Grades Investigation Committee's Report has shown quite clearly that the Down type carcass is no longer a premium product.

CURRENT LAMB PRODUCTION ECONOMICS

A decision as to which sire of a given breed should be selected, or which breed of sire should be purchased, should be based on the likely effect this decision will have on the profitability of a lamb production venture. In the 1967-8 season schedule prices for export lambs, the factors of obvious importance were:

(1) Carcass Grade

Over the season, there was a fluctuating differential ranging from 0.8 to 1.8c per lb in favour of Prime lambs over Ys in the 20 to 28 lb carcass weight range and a 0.4c per lb advantage in the 29 to 36 lb range. The differential disappeared in the 37 to 42 lb range and favoured the Y by 1.2 to 1.7c per lb in different schedules in the 43 to 56 lb range. As most New Zealand carcasses fall in the lighter weight ranges and will grade Prime or Y, only the effect in the 20 to 36 lb carcass weight range and their effects on the income from lamb need to be considered. Take, for example, the case of two sires

who produce lambs of the same average carcass weight, but 10% more of those from one sire grade Y in contrast to the carcasses from the other sire. In the 20 to 28 lb range, 10% more Ys would have lowered returns on average by about $3.00 per 100 lambs whereas in the 29 to 36 lb range, receipts would have been lowered by less than $1.50 per 100 lambs. Thus, the influence of grading on financial return is small when compared with the next factor to be considered.

(2) Carcass Weight

Consider two sires which produce lambs with the same proportion grading Prime but those of one have a higher growth rate than those of the other and average 1 lb heavier carcasses than the slower-growing progeny of the other sire.

An average increase in carcass weight of 1 lb was worth $13.90 per 100 lambs in the 20 to 28 lb range and $13.50 per 100 in the 29 to 36 lb range based on the December schedule which was roughly representative for the season. These results show that it takes an average increase in carcass weight of approximately 1/6 of a pound to offset a 10% increase in carcasses grading Y. In simpler terms, carcass weight is very much more important than grade in determining the income from lamb carcasses.

(3) Wool Pull

Little information is available to indicate the factors influencing weight of wool pull, but some work is now being done on collecting wool weights at shearing from lambs of different breeds and crosses to indicate the likely effect of breeding on wool pull.

(4) Price of Sire

This factor is not directly affected by export schedule prices other than through the influence of different sires on the factors previously mentioned (grade, carcass weight, wool pull). However, as it has been shown that growth rate and its effect on increasing average lamb carcass weight is the single most important factor in influencing returns from lambs, it follows that rams which produce lambs with a faster growth rate are very much more valuable than rams which produce lambs with a slower growth rate. An indication of the increased value to a farmer of a sire which produces heavier lambs

TABLE 1: VALUE TO FARMER OF SIRE WHO LEAVES PROGENY WITH HEAVIER CARCASS WEIGHTS (FASTER GROWTH RATE)

Increased Carcass Wt (lb)	*Ewes per Sire*	*Increased Profit per Year ($)*	*Years per Sire ($)*		
			3	*4*	*5*
1	50	6.50	19.50	26.00	32.50
	100	13.00	39.00	52.00	65.00
2	50	13.00	39.00	52.00	65.00
	100	26.00	78.00	104.00	130.00
3	50	19.50	58.50	78.00	97.50
	100	39.00	117.00	156.00	195.00
4	50	26.00	78.00	104.00	130.00
	100	52.00	156.00	208.00	260.00

is given in Table 1, which is based on the assumption that this increased carcass weight is worth 13c per lb and lambing percentage is 100.

Allowance is made in Table 1 for a farmer who uses 2% of rams over his ewes and for the farmer who follows Ruakura advice and uses 1% of semen-tested rams. Allowance is also made for the effects of using the superior sire for 3, 4 or 5 seasons.

The figures in the right-hand columns show the increased value to a farmer of a sire that produces heavier lambs and is used for three or more seasons when contrasted with an average sire. If a farmer can get the superior sire for the same price as a sire that is producing slower-growing lambs, he is making the additional amounts of profit indicated in the table for his appropriate sire's superiority, the percentages of rams used, and the number of years he uses his rams. Alternatively, he can afford to pay more for a superior sire (by up to slightly less than the amounts indicated in the table) and he will still be making more profit than by using an average sire, and the ram producer will be rewarded for producing the superior animals.

The above analysis is, of course, a slight over-simplification of the situation and takes no account of changes in grading, wool pull or possible increased lamb mortality through difficult births if the lambs are too large.

RESEARCH AT RUAKURA

A research programme has been under way for several years at Ruakura to try to find methods of identifying

the superior rams. The Genetics Section is investigating the liveweight growth of progeny from a variety of sires and the Meat Section is looking at the effects of different rams on carcass weights and carcass quality. We are interested in methods of identifying the best rams within any breed and in obtaining factual information on the differences between rams of different breeds. Information is being collected on the progeny of about 35 rams per year, and in the breed trials it is hoped to test at least 10 sires from each breed. The purchasing policy is to attempt to buy the average type of ram available to the commercial producer. The lambs from each sire breed are studied for at least two seasons and in at least two localities.

All sires are individually mated to approximately 30 similar Romney cast-for-age ewes. After mating and lambing, all ewes are run together so that the ewes and subsequently the lambs receive the same nutritional treatment.

At about weaning, all lambs in each sire group in the main trial at Ruakura are divided into three equal groups (in terms of same average liveweight, same proportion of wethers and ewes, singles and twins etc.). The first third of the lambs from each sire group is slaughtered at 17 to 19 weeks of age, the second third is slaughtered five weeks later and the last third a further five weeks later. This procedure gives information on the type of lightweight, intermediate-weight and heavy-weight lambs produced by each of the sires. The method of selection for slaughter gives information of the type that would have been obtained if all the lambs from each sire group had been slaughtered at each of the slaughter ages, and also provides accurate growth information right up to the last slaughter stage.

The information collected at slaughter consists of carcass weight and grade, and subsequently information is obtained on proportions of the various cuts, fat and meat distribution in the carcass, and palatability of the meat as indicated by a consumer taste panel (see *N.Z. J. Agric., 116* (1): 11, 1968). In the course of a season, roughly 100 observations are collected on each of 1,000 lambs.

RESULTS FROM TRIALS

Trials of the kind described have been carried out previously at Ruakura and at Lincoln College although less detailed information was collected. The present Rua-

kura trials have resulted in four years' data being completed and the carcasses from a fifth years' lambs are being analysed at present. Owing to problems of data analysis, the results of the present trials have not been thoroughly examined, but from these and some earlier trials some tentative conclusions can be drawn.

(1) WITHIN BREEDS

There are considerable differences in the growth rate between different sires within any breed. In one experiment (Table 2), using 10 sires of the Southdown breed, the lambs from one sire averaged more than 5 lb heavier in carcass weight than the lambs from another sire when the lambs from both sires were slaughtered at the same average age.

TABLE 2: DIFFERENCES IN CARCASS WEIGHT (lb) BETWEEN THE PROGENCY OF TEN SOUTHDOWN SIRES IN ONE SEASON

Sire No.	*Adjusted Carcass Weights* (lb)*
1	0
2	1.9
3	2.4
4	3.3
5	3.4
6	3.7
7	4.2
8	4.3
9	4.6
10	5.5
Range = 5.5 lb	

* The carcass weights of the progeny of individual sires have been expressed as positive deviations from the mean carcass weight of the progeny of the poorest sire (No. 1).

The ram which produced the faster-growing lambs would be very much more valuable to a commercial producer. The only method which it is believed will accurately select such superior sires is the use of growth records to identify the rams which are themselves the fastest gainers. Overseas results show that rams with the fastest growth rates produce the fastest-growing lambs. Farmers should purchase rams from flocks that are being performance tested and a National Flock Recording Scheme has now been set up to assist flock owners with performance recording and the calculations that are necessary with the records.

(2) Between Breeds

Ruakura and Lincoln College results show that some breeds grow faster than others. Table 3 gives some Ruakura results from one breed comparison trial which, even allowing for the small numbers for each breed, demonstrates that there is a range of carcass weights within a breed and usually a considerable overlap between breeds. Of interest is the fact that in this trial the Suffolks, on average, produced the heaviest lambs, but, in spite of this, the best sire for the trial was a Dorset Down. This demonstrates the desirability of having within- as well as between-breed information.

Table 4 contains a summary of the grading and average carcass weights of some breeds when compared with the Southdown which is the most popular breed of sire used for export lamb production at present, and which is being used as the standard. The present results must be regarded as tentative, and, as the trial is not yet completed, some breeds are not represented and others have not been completely studied. Poll Dorsets and Ryelands are currently in the trials.

TABLE 3: DIFFERENCES IN CARCASS WEIGHT (lb) BETWEEN THE PROGENY OF THREE SIRES FROM EACH OF FIVE BREEDS IN ONE SEASON

Breed	*Sire*	*Adjusted Carcass Weights* (lb)*	*Within-breed Range (lb)*
Romney	A	0	
	B	4.1	5.6
	C	5.6	
Dorset Down	D	8.4	
	E	10.1	3.3
	F	11.7	
South Dorset Down	G	8.4	
	H	9.7	1.6
	I	10.0	
Cheviot	J	6.6	
	K	8.0	2.2
	L	8.8	
Suffolk	M	10.7	
	N	11.3	0.7
	O	11.4	

* The carcass weights of the progeny of individual sires have been expressed as positive deviations from the mean carcass weight of the progeny of the poorest Romney (Sire A).

TABLE 4: GRADES AND CARCASS WEIGHTS OF LAMBS SIRED BY DIFFERENT BREEDS

Sire Breed	*No. of Sires Tested**	*Grading % Primes*	*Carcass Weight (lb)†*
Romney	10	20	—3 to —5
Cheviot	11	45	—1 to +0.5
Southdown	41	75	Standard = 0
South Dorset	11	65	+0 to 2.5
Dorset Down	11	65	+1.0 to 2.5
South Suffolk	5	70	+1.0 to 1.5
Hampshire	5	75	+1.5 to 2.0
Border Leicester	6	60	+1.0 to 2.0
Suffolk	10	50	+1.5 to 2.5

* The figures in this column give the number of ram records; in some cases, more than one record has been obtained on the one ram because of testing at different locations. For example, the 11 Cheviot progeny tests came from nine different sires.

† The carcass weights presented are expressed as differences from the Southdown average. The ranges presented are those for *breed means* in different trials.

The grading results show that the sire breeds fall into three main classes with the straight Romney having the lowest proportion of Primes, the Cheviot, Suffolk and Border Leicester having an intermediate number of Primes and the Southdown, South Dorset Down, Dorset Down, Hampshire and South Suffolk producing the lambs with the highest proportion of Primes. This proportion is a reflection of both carcass weight and the relative fat content of the various breeds. As a general rule, as the carcasses of any breed or cross get heavier, their proportion of fat increases, and, as a second general rule, fat is the main factor taken into consideration when grading lamb carcasses. The Romney has graded poorly both because of its light weight and because of the lower fat content. Tentative results to date suggest that the Southdown produces the fattest carcass at any given carcass weight and the remaining sire breeds produce leaner lambs. The breeds that have a higher proportion of Primes will have a higher fat content than the breeds with a lower proportion of Primes. In terms commonly used in the farming community, the lambs with the highest fat content are said to be early maturing and the breeds with the lowest fat content are said to be late maturing. However, research is showing that while breed has some effect on the amount

of fat in a lamb's carcass, the factor which has the greatest effect is nutrition, and over-nutrition is likely to be the main factor responsible for the excessively fat lambs produced in New Zealand. In addition, the breeds with the highest fat content would be the first to show up overfat and at slightly lighter carcass weights than the leaner breeds.

The relative carcass weights of the lambs from the different sire breeds are given in Table 4. A possible explanation for the low growth rate of the Romney breed in the present trials is the fact that this is the only pure breed being studied whereas all the other lambs are crossbred (with the Romney as the dam) and so may have some growth boost through hybrid vigour. Most of the other sire breeds studied produced heavier lambs than the Southdown. In this regard, it must be noted that the figures presented are breed means, but about 50% of the sires in each breed will produce lambs lighter than the mean. If a farmer wishes to make certain of heavier lambs through changing his breed of sire he should aim to select rams that are above the flock average for growth rate which means buying his sires from a ram producer who performance tests his sires by the use of weight records. If a farmer buys sires of inferior performance in any breed, even though they may have been fed very well and look very good sires, they are almost certain to produce lambs with less-than-average growth rate and the farmer may get little or no benefit from having changed his breed.

In the results looked at to date there is little evidence to suggest that the lambs of the different breeds have changed their weight rankings as the season progressed.

Research from Ruakura is showing that the meat from lambs sired by all breeds of ram studied is very palatable when judged by the Ruakura lamb taste panel so it can be concluded that all these breeds produce lambs of satisfactory eating quality. Tests to date have shown no differences between the lambs of any of the breeds or crosses studied.

CONCLUSIONS

(1) In terms of producing meat that is edible and salable, the results of an extensive trial is showing that all breeds of sires being studied are satisfactory.

(2) No one breed of sire is likely to be best for all New Zealand conditions.

(3) Where there are problems of grading and a very high proportion of Ys, the Southdown, which tends to produce the fattest lambs, is likely to be the best breed, with breeds such as the Dorset Down, South Dorset Down, South Suffolk and Hampshire not very far behind and having the advantage of giving slightly heavier lambs.

(4) Conversely, if the problem is one of too many overfat lambs, the Southdown, which on average produces the fattest lambs, would produce more overfats than some of the other breeds available. However, farms producing overfat lambs are probably understocked and the problem should first be considered from a management point of view before a change of sire breed is contemplated. At Ruakura, we now have grading results on the progeny of more than 50 Southdown sires and, although, on average, the Southdown cross lambs have always been the fattest of the breeds and crosses studied, we have not yet produced a single overfat lamb which indicates the importance of the management factor.

(5) Where no grading problems are being experienced, the review of factors influencing profitability given earlier suggests that the aim should be to increase average carcass weights by using sires that produce lambs with a faster growth rate (at least up to 36 lb carcass weight). This may be achieved by selecting the sires that will produce faster-growing lambs from within any breed by the use of growth records or by the selection of sires from breeds which, on average, produce lambs with the faster growth rates. There is considerable scope for selection of the "best" sires within any breed. The potential ram buyers should ask for the growth record from the stud he patronizes, and, if these are not available, he should seek his rams elsewhere where such records are available. Now that the sheep industry has its own flock recording scheme, such information should become increasingly available.

(6) If the price for the rams with the best growth records is too high, it may be more profitable to buy cheaper rams with slightly lower records. A method of arriving at the increased value of rams from a breed or breeds which is likely to produce the higher returns is indicated in Table 1.

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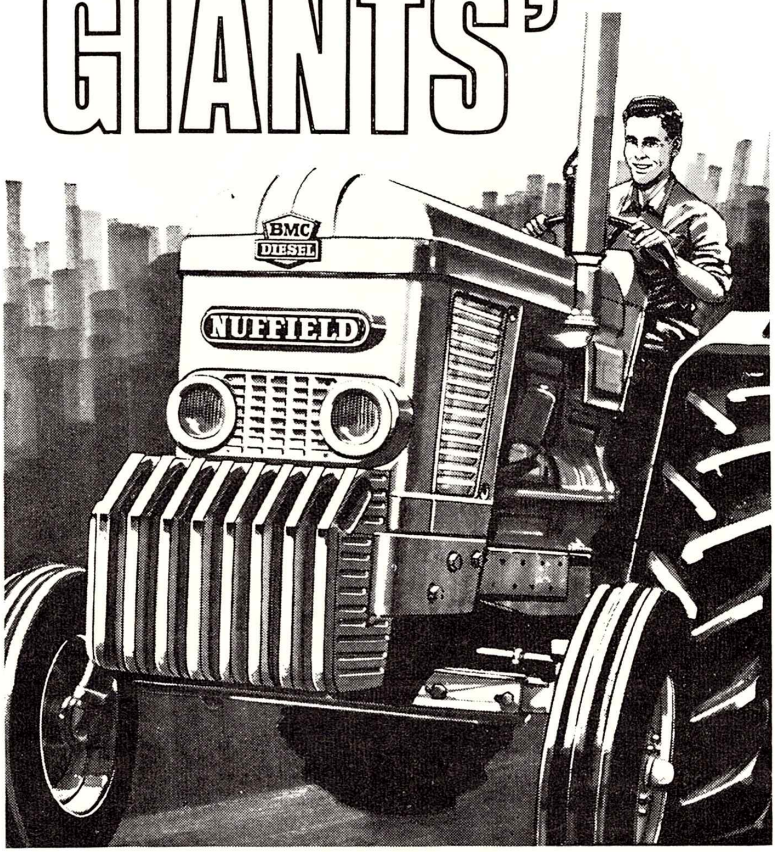

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THE CONTROL OF GORSE

E. M. SMALL*

THERE are twenty species of gorse (genus *Ulex)* and, of these, three are native to Great Britain. The New Zealand species *(Ulex europaeus)* is one of these. It was one of New Zealand's earliest immigrants having been observed as a hedge by Charles Darwin at Waimate when he visited the Bay of Islands in 1835.

Gorse thrives on a great variety of soils but only within a fairly narrow climatic range. It does not like extreme cold, and, in New Zealand, is rarely found above 1,500 ft above sea level. It does not grow in the tropics, in hot dry countries, or in those with very cold winters. In fact gorse occurs as a serious weed only in a few places in the world where the climate is suitably temperate, such as New Zealand, Tasmania, coastal Oregon and Ireland.

Gorse prospered in New Zealand. Before long it became an aggressive and obnoxious weed.

On arable land, cultivation maintained control, but the weed spread freely into associated small gullies and the beds of streams. On second-class hill country, where the sward was too thin and the grazing animals too few to prevent the establishment of seedlings, gorse rapidly invaded the pasture.

No measure of the total acreage of gorse in New Zealand is available but it is well known that many thousands of acres of otherwise excellent pasture land are heavily infested with it.

A knowledge of how gorse grows and develops and of how it reproduces is the foundation on which a plan of eradication should be based. Among large areas of gorse, some bushes may flower in the autumn and shed seed from June until August, but most plants flower in great profusion during winter and early spring, and cast seed during the summer from November to February.

In the top two inches of soil beneath dense old-established areas of gorse, seeds may build up to 14 or 15 million per acre.

The seed is spread by ejection from the pod and may land up to 16 ft from the bush so that an area of dense gorse or even a single bush can spread rapidly from its perimeter. Gorse seed may spread in other ways and establish great distances from its source. For example,

* Massey University, Palmerston North.

seeds may be carried in mud attached to vehicles, or to the boots of men or the hooves of animals, or it may be carried on the fleece of a sheep. Birds eat the seed and it is believed that at least some viable seeds are voided in the droppings. Wind may increase the distance from the bush that seeds fall and pods with seeds attached have been found considerable distances from the parent plant. The gorse-infested beds of many rivers show how efficient a stream of water can be as a distributor of seed, and the removal of river shingle with its burden of seeds is carried far and wide to be deposited on roads and the verges of them bordering thousands of miles of farmland. Obviously, therefore, the owner of a property with no gorse should maintain a vigilance which ensures the destruction of each plant as it appears.

The coat of the seed of gorse is hard and tough. If a sample is scarified or subjected to heat treatment with fire or water to make it permeable to moisture, up to 90% germinates within eight days.

In the field, seeds may lie in the top two inches of soil waiting for 30 to 40 years or longer for the coat to soften. Each year during this period some seeds germinate and establish if circumstances are favourable.

However, about eight to ten years after the commencement of a programme to eradicate gorse, the numbers of seeds in the soil are greatly reduced. With pasture management directed toward a vigorous, dense sward, the annual cost of control and of the final eradication of gorse is greatly reduced.

On its way to maturity, the seedling gorse plant passes through two forms. At first it has many 3-foliate leaves and the plant exhibits a compact, almost rosette-like pattern of growth. During this stage, which may last from two to several months, the plant is soft and therefore palatable to grazing animals. It is a nutritious feed at rather better than maintenance level.

The second form is due to the appearance of simple leaves which slowly become narrower, smaller, more pointed and awl-like. At this stage rapid extension growth occurs, spines develop, from which many more spines branch but the plant remains quite palatable and is readily eaten by hungry sheep.

Finally, and often not until the second year of age, the plant forms many additional branches, and the typical spiny impenetratable adult plant appears.

Each year, rapid growth in the form of leafy shoots springs from the tip of each branch. A peak of growth

is reached about mid-November to December, at which time the plant is most vulnerable to the effects of chemicals sprayed upon it. With this introduction to a weed which is now known to be a most aggressive seedling and a tough unyielding adult plant, the methods used for the control of gorse can be reviewed.

BIOLOGICAL CONTROL

Biological control in agriculture refers to the control of obnoxious plant or animal organisms by other organisms which attack the undesirable species.

This method of control in New Zealand actually commenced in the 1860s with the introduction of stoats, weasels, ferrets etc. to prey upon rabbits.

It was not however until 1920 onwards that biological control of insects and plants assumed major importance since when many beneficial insects have been imported to prey upon harmful insects and plants. The successes in this field have been well illustrated by the control of such insects as woolly-aphis, white butterfly, etc. Some localized success has been apparent with plants such as St. John's wort and manuka scrub.

The only insect utilized for the control of gorse in New Zealand has been the seed weevil, *Apion ulicis* (Forst). In 1931, when the weevil was introduced, gorse had considerable value as a hedge plant. For this reason, a seed-destroying insect was chosen in preference to a general defoliator or stem boring insect. The female weevil lays her eggs in the seed chamber of the pod and when the grubs hatch they feed upon the seeds, but rarely do they consume all the seeds.

During the summer of 1957 and 1958, a survey of weevil damage was carried out on 37 gorse areas in the Wanganui district. An estimated 20 to 40% of the seeds produced were destroyed by the weevil, but enough viable seed was left to ensure that the weed would continue to spread if not controlled by other means.

It is, however, reasonable to assume that the seed weevil is responsible for a reduction in the aggressiveness of gorse. Owing to the priority being given to the control of grass grub and porina, the Entomological Division is not at present working on the problem of gorse control. The possibility of further introductions of insects for this purpose is, however, being kept under review, and to this end the Commonwealth Institute of Biological Control is looking for suitable agents.

CULTIVATION

The successful eradication of gorse through cultivation is well known. The advantage of it is that a high-producing pasture can be rapidly developed, and provided it is well grazed, the small amount of gorse that erupts above the pasture can be dealt with quite cheaply.

On steeper country, where giant discs are used and the soil is poor and shallow, it may take some years for a vigorous dense sward of grass to develop. Here, seedling gorse may become established, in which case it should be cut at the base, or grubbed, or if it occurs in patches sprayed with herbicides as soon as it appears.

On steep sidlings, the practice of bulldozing gorse into the nearest gully has become a popular technique. Its disadvantage is that, in the process, much of the topsoil also ends up down in the gully, and the sidling, stripped of its most fertile soil, takes a long time to support a good pasture.

A refinement of the bulldozer method is the root-raking blade fitted with large steel teeth which rakes about four inches deep to take out the gorse and let most of the soil fall back to the ground. The gorse is then pushed into the gully with enough soil to let it compact and to provide for a seedbed on top. The paddock is cultivated and a pasture established. If the foliage of the gorse is reduced by burning before the root-raker begins, the remainder can be pushed to the gully floor at a much smaller cost. The fire also destroys many seeds on the surface of the soil. A practical insurance against gully erosion is to bury a line of large tiles along the bottom of each gully before the work begins.

FORESTRY

In many parts of New Zealand poor stony land and equally poor but sometimes rugged hill land infested with gorse has been controlled by planting trees to smother the weed. The popular species has been *Pinus radiata* which grows vigorously after it erupts from the gorse and at maturity provides marketable timber which is a valuable crop if it can be harvested at reasonable cost.

In 1964, sixty acres of fern and gorse on Banks Peninsula was burnt in the autumn and planting began in May. Because of dry conditions, 50% of the early planted trees died but only 1% among the later plantings. Two-

year-old trees were planted by contract at spacings of 6 ft by 8 ft at a contract price of $15 per 1,000. The total cost was $49 an acre of which about 75% was financed from a farm forestry loan.

At Pongaroa, in 1965, D. P. Humphries planted thirty acres of dense gorse at 6 ft × 8 ft spacings for a cost of $3,000. Again, owing to unfavourable post-planting conditions, 80% of the trees had to be replaced in the second year and 10% in the third year. At Tiritea, Palmerston North, a 30-acre block of dense to scattered manuka and gorse was planted on a steep, rugged greywacke hillside. It was burnt in the autumn and planted at 6 ft × 6 ft spaces in the winter and fenced. The labour was the owner plus one man and the cost was $1,200.

A common technique for establishing the trees is to burn the standing gorse in the autumn and plant the trees in the following winter. Regrowth of gorse is often more rapid than the trees so the block must be sprayed with 2,4,5–T just before the trees erupt above the gorse about two or three years after planting.

The cost of establishing trees to eradicate gorse must be weighed against other methods and must have regard for the profitability of the land for pastoral versus forestry use.

STEEP HILL COUNTRY

In 1956, E. Feist, of Brunswick, Wanganui, reported to the Massey Sheepfarmers' meeting on the development of a plan to eradicate gorse on a 900-acre property which, in 1941, had nearly 80% of its area covered in heavy gorse, so that only 200 acres of it was in pasture. By 1956, 400 acres were free of gorse or being developed. The advent of chemical herbicides and improved prices for farm produce, made the development of larger areas possible. Today, twelve years later, Mr Feist reports progress as follows:

"Over recent years, steep hill country development has become more practicable with the advent of the helicopter and other modern aircraft, hormone herbicides, improved pasture species and cheaper methods of fencing. Weed control is a tax deductible item and this incentive, along with easier physical work, makes the clearing of pasture weeds a much more worthwhile task than it previously was.

In tackling a gorse eradication programme the first and most important task is to have the work properly

planned. A lot of money is going to be spent over a number of years and complete planning of the whole project is essential.

The farm budget must be studied first and only then can it be decided which area to tackle. A decision on the size and location of the area must also be made well ahead of the commencement of operations.

Using the 'burn first' method means selecting a block of gorse that has not been burnt for five or six years. The optimum time for a successful burn is late February to early March, but the day of the fire should be carefully selected. Early afternoon with the temperature high and humidity low and a very slight breeze is the best time and kind of day.

Normally gorse is not difficult to burn but if patches are missed they can be relit within a day or two to complete the burn and to establish a suitable seedbed. Isolated clumps and single bushes standing beyond the perimeter of the areas of dense gorse can be chemically sprayed and burnt or chopped down with a slasher.

The sowing of seed from an aeroplane is the next move and, as the seedbed is not perfect, not less than 30lb per acre of grass seed of the highest purity and germination should be used. There are enough weeds now without adding to the collection. Also, on this unploughable hill country, the burn provides a seedbed and the only opportunity of rapidly establishing improved grasses in the pasture. The aerial seeding firm should have been booked far enough ahead to ensure that the seed is sown before the ash has blown away. Evenness of spread depends on the pilot's skill and familiarity with the country, and also on air movement which should be calm to very slight.

The paddock must now be fenced and this can be done more cheaply now than ever before with a low-cost steel wire fence. Paddock size should be related to the number of stock on the farm which are available to use at concentrations of 50 or more per acre to prevent the establishment of seedlings and growth of young gorse.

Having fenced the block (preferably on ridges to prevent the damage to fences from slip erosion), it should be spelled to allow the grass to establish. About six weeks from germination the pasture should be fed off with sheep to encourage the development of clovers and a good sward of grass. Stock management over the first winter is also designed to develop a vigorous pasture.

Topdressing with superphosphate at 3 cwt per acre on the new grass is essential to the establishment of a good grass cover. It also boosts the growth of gorse seedlings. The pasture gets another 3 cwt of superphosphate per acre the following autumn and thereafter is maintained with 1½ cwt per annum sown in the autumn.

The first spring brings a crop of variegated *(Silybum marianum)* and other thistles, foxglove *(Digitalis purpurea)* and other weeds. A spraying of 2, 4–D with a helicopter in mid-September kills these and prevents them from forming a cover for the establishment of gorse seedlings and from spreading themselves over the farm.

During the first spring, dry sheep are used in mobs to control the development of young gorse and to aid the establishment of a vigorous pasture. The late spring and early summer gives an opportunity to take excessive fat off breeding ewes by using them in high density mobs to control weeds and pasture growth. The following spring (about 20 months after burning), calls for more vigilance and planning.

When gorse begins to grow early in September, the shoot is soft and the reaction of it to the herbicide is much more rapid and efficient than the older, tougher, lower portions of the branch. The spring growth is most rapid during November and December, but with the onset of dry summer conditions, a much slower rate of growth and a rapid increase in the percentage of fibre and the toughness of the branch is apparent. The most effective time to spray, therefore, is between mid-November and mid-December, when the new shoots have reached a length of from three to four inches.

To achieve this high density, stocking with sheep during the spring is used to prevent the establishment of new seedlings and the regrowth of plants which established during the previous year. Two or three weeks before the regrowth is sprayed all sheep and cattle are shifted off the area to let new growth develop.

A helicopter is used to do the spraying. It must be booked well ahead to ensure that the herbicide is applied at a time which has been calculated to give the greatest and most efficient percentage of kill. Spray from a helicopter does not saturate as completely as from ground work, so a higher concentration of herbicide at one gallon of 2,4,5–T per acre in 50 gallons of water is necessary, and the timing of the operation is more critical. Because of the importance of getting the recommended amount of

herbicide sprayed on to each acre, the area of the paddock being treated must be known.

Having sprayed the gorse, grazing animals should be kept off the area for two to three weeks to prevent the loss of the soft tips of the branches while they are wilting and are full of the herbicides. This seems to be a most important point and neglect of it may be one of the reasons for the apparent failure of aerial spraying.

The damage that 2,4,5–T does to clover is considerable and the loss is replaced by sowing three to four pounds of white clover with the superphosphate dressing following spraying.

From this time (20 months after the burn), stock management must be watched closely to ensure that the pasture never becomes too rank and that gorse is suppressed during its growing period.

After two years (44 months after the burn), some gorse will have survived and seedlings will be hardening so a further spraying is essential. The choice of how the work shall be done will depend on the efficiency of past management and seasonal influences. Many sticks will still be standing and lying about.

In the past it has been advocated that this spraying be done by ground contractor but the effect of high labour charges could make the use of a helicopter for the second time a cheaper method.

Ground operating contractors have charged up to $50 per acre, at which cost the work is quite uneconomic. When the acreage to be sprayed is of any magnitude, a price should be arranged by tender when competition permits the choice of an experienced operator at a reasonable cost.

If there is good gorse spraying equipment on the farm, a better and cheaper job than the average contractors can do is possible. A ground spraying unit can be operated by one man but a two-man team is more efficient. Using two men the labour input is five hours per acre.

A period of two years can now elapse before any more major spraying is necessary but pastures must be kept short through efficient control of grazing management. The third spraying (five years eight months after the burn) can be done for half the cost of the second spraying provided isolated regrowth on long stems are grubbed or cut. It is best if done with the farm labour unless a very enterprising and thorough contractor can be found who will be prepared to do the work at a special rate since the gorse is now more scattered. It has been found

that some areas of gorse can be almost eradicated after three sprays, while other areas take at least four treatments. At this stage, after a lapse of some eight years, and provided that no gorse has reseeded, the work can be controlled by grubbing, along with a knapsack type sprayer for the few thick patches of seedlings, especially on eroded parts.

Although, as time passes, the work becomes cheaper, persistence and vigilance is always necessary. One cannot afford to let any gorse plant flower and seed or the good work done so far is completely lost.

The worth of this work is borne out by the fact that these steep unploughable hills, originally completely covered with old man gorse, can, with the clearance of gorse, and with many years of careful management and topdressing with superphosphate, support five ewe equivalents per acre. While it is true that the eradication of gorse is a very expensive business, it is equally true that, today, with high costs and lower prices for produce, no farmer can afford to have idle land."

GORSE ON THE EAST COAST

A second report of a plan to eradicate gorse on hill country comes from D. P. Humphries of Pongaroa, in the Akitio County. His property of 2,400 acres, of second-class hill country, is located four miles from the East Coast. The rainfall is 45 in. but dry summers accompanied by strong westerly winds are a feature of the district. Fifty per cent of the property is discable and the balance is steep gullies and hillsides with difficult access.

The first gorse on the property was planted as a hedge about the turn of the century and the ditch and bank of it remains as mute evidence of this tragic mistake.

The present owner's family took over the property in 1908 and for many years waged a losing battle with fire and grubber against the spreading gorse. It finally got out of control. In 1952, when the present owner took over the management, 500 acres were infested with gorse from scattered large patches and bushes to dense blocks up to 8 ft in height.

In the late 1950s, a large-scale development programme was initiated. By 1960, 1,000 acres of manuka scrub and gorse had been giant disced, burnt, cultivated, sown to grass, topdressed and stocked with sheep and cattle. The cultivation extended into 300 acres of gorse and destroyed it, but regrowth from seedlings rapidly appeared, and,

within three years, gorse was once again taking control. The 200 acres of steep sidlings in heavy gorse remained a problem.

In 1960, with the guidance of the Department of Agriculture, a new plan was adopted. The worst section was sprayed by air with CS301 to aid burning. The burn was very successful. It was sown with a seed mixture which normally is 8 lb of clover (50/50 subterranean and white) per bushel of ryegrass and sown at 35 lb per acre. With perfect growing conditions, an excellent pasture was established and topdressed with superphosphate at 3 cwt per acre. Paddock size was reduced with electric fences to approximately 40 acres and the area was mob-stocked with 2,000 ewes.

Aerial Spraying

Eighteen months after the burn, it was apparent from the amount and size of the regrowth that mob-stocking with sheep was not fully effective. It was therefore decided to treat the worst area with 2,4,5-T, sprayed on with a fixed-wing plane. The urgency of the work relative to getting the greatest effect, and to the rapid reversion taking place, combined with difficulty of access, decided the method.

Ground Spraying

By 1963 it was obvious that aerial spraying with 2,4,5-T, although expertly done, had barely subdued the regrowth. Clearly, new thinking was required. It was decided to work from the ground.

Three miles of access roading and ten dams to supply water were developed to service ground spraying with 2,4,5-T, which continued with dogged persistence for the next three years until the summer of 1966.

During this period, 30 acres got completely out of hand and with the aid of a farm forestry loan was planted with *Pinus radiata*. A further 50 acres was recultivated, cropped and grassed for $1,500. In addition $7,500 was spent on contract labour and 2,4,5-T. The total direct cost of control on 500 acres of gorse-infested land was by this time $12,000.

A New Approach—Summer 1966

In 1964, a half-acre trial to compare 2,4,5-T with the new systemic herbicide, picloram, better known as "Tordon", was laid down. No attempt was made to estab-

lish pasture. By 1966, gorse on the plot treated with picloram had disintegrated to a few rotten sticks and no regrowth from stump or seedings could be observed. The only growth was from a few thistles, flat weeds and grasses. It appeared that a new approach to the gorse problem was available.

Past experience greatly influenced decisions at this time. Over the 2,4,5-T aerial and ground work period of six years, many difficulties were encountered. Apart from the normal routine of planned control work, there were problems like the dry windy climate and its adverse effect on pasture establishment, the vigorous regrowth of seedlings, the unavailability of contractors at the right time and hence the difficulty of completing the spray programme on the steep country before the onset of summer hardened the new growth. Of greatest concern was seedling regrowth following both the cultivation and burning technique. The long-term outlook was grim and clearly one season's failure to control establishment and growth would mean the loss of all that had been gained so far. In fact, gorse had not been eliminated on any part of the 500 acres after six years of intensive effort.

The Change to Picloram

Having regard for the lack of success so far with 2,4,5-T, and the apparent success of picloram on the trial plots, it was decided to use the more expensive herbicide on a large scale.

During January and February 1966, 400 acres of gorse which varied in density from fairly extensive patches to single bushes, and in height from small seedlings up to 3 ft, were sprayed from the ground with 125 gal of picloram and 25 gal of 2,4,5-T. The "kill" with picloram was excellent but with 2,4,5-T was nil.

In 1967, 40 gal of picloram and 200 lb of picloram pellets completed the 500-acre block and check sprayed the previous year's work. The dense patches of gorse were sprayed and pellets were used on the isolated bushes and small clumps. Also the area on which 2,4,5-T was used the previous year was resprayed with picloram to compare results.

This year, 1968, the quantity used has been reduced to 30 gal of fluid and 150 lb of pelleted picloram and a rapid progressive reduction in the annual requirement of herbicide is confidently expected. The cost of picloram is 300% greater than 2,4,5-T but in view of its efficiency its cost in the long term is expected to be less.

Any material that destroys gorse also kills clover. It was decided to wait two years for the residual effect of the herbicide to leach away, so, in March, 1968, the area treated with picloram in 1966 was oversown with a 2 to 1 mixture of inoculated, pelleted white and subterranean clover seed sown at 6 to 8 lb per acre.

SUMMARY

In the six years up to 1966, the results were little better than when the work was started.

The effect of using picloram can be seen this year. Only the spraying of areas that re-seeded in the wake of 2,4,5-T, and the human element involving the "mist" spraying of scattered bushes, have involved the farm staff in any measure of control work at all. Over the area treated with picloram no regrowth from parent bushes has occurred and very few seedlings have established.

As a result of the change in policy, plus favourable weather conditions for the establishment of clover, top-dressing with 3 cwt of superphosphate and the rapid breakdown of the gorse, the picture at present is a pasture almost free from gorse and an owner fully confident that it will shortly be a weed of the past.

DISCUSSION

The experience of men who have succeeded in the eradication of gorse from their pastures has clarified the absolute need to recognize and act upon several basic principles when planning the development of gorse to grass.

These are:

(1) Careful planning of financial and technical aspects to ensure that, having begun a programme, it is carried on to a successful end.

(2) That the initial attack of a successful burn greatly reduces the cost of chemicals, paves the way for the establishment of a high-quality pasture, and destroys or prepares for an early germination a high percentage of the gorse seeds in the soil.

(3) That the use of grazing animals to control the regrowth of gorse is ineffective unless used at high density during periods of active growth from about the end of September to late autumn.

(4) That animals will not eat unpalatable food unless they are hungry. Hence a rotational system of feeding must be organized to ensure that the animals are well fed for one day but hungry for the next four or five.

Densities of least 30 but for preference of 50 or more dry sheep per acre on each paddock in rotation are essential, and the pressure of grazing must be maintained until gorse enters its period of dormancy with the approach of winter. Failure to do so has ruined many well laid plans to control gorse.

It may be said here that breeding ewes have limited use in this role because their greatest nutritional need is during lactation when gorse growth is reaching its peak.

(5) Cattle used in conjunction with sheep are soon in fierce competition with them and by grazing into rugged corners prevent the establishment of patches of long grass which provide the ideal environment for the establishment of seeding gorse.

(6) Recognition of a healthy, dense sward of productive pasture as the greatest long-term enemy of seedling gorse.

(7) The first spraying with herbicide must be timed for the period of greatest effect.

(8) That ground spraying under the supervision of the owner is the most effective technique for getting the herbicide to the plant.

(9) That the choice of a herbicide should be made in response to the results of a comparative trial in the locality.

(10) That the eradication of gorse depends finally upon the drive and energy and tenacity with which the owner carries his programme to a successful conclusion.

Finally, it appears that more needs to be known by farmers with a gorse problem about how the plant grows so that the attack with fire and grazing animals and with herbicides can be launched at the moment of greatest effect. Too often, the attack is a badly planned "hit and miss" affair that leaves in its trail an everlasting problem of control. It is significant that when success attends a plan to eradicate gorse, the operation has invariably been planned on a scale well within the capacity of available resources; that the method best suited to the particular situation has been used and above all that the owner has been dedicated to the final eradication of the weed and does therefore continue his vigilance long after the last gorse bush has apparently been destroyed.

LITERATURE CONSULTED

Anon., 1965: *Farm Forestry,* 7 (3): 89-90.
Chater, E. H. A., 1931: *Bull. Ent. Res. 22*: 225-35.
Given, B. B., 1964: *N.Z. Sci. Rev., 22*: 2.
Hoy, J. M., 1964: *N.Z. Sci. Rev., 22*: 17.
Little, E. C. S., 1959: *The Biology of Weeds.* Oxford, Blakwell, p. 176.
Millener, L. H., 1961: *The New Phytologist, 60*: 339-54.
Miller, D., 1964: *N.Z. Sci. Rev., 22*: 4.
Moffat, R. W., 1965: *Proc. 18th N.Z. Weed and Pest Control Conf.,* 17-23.
Moss, G. R., 1960: *N.Z. J. Agric., 100*: 561–7 (June).
Moss, G. R., 1959: *Proc. 12th N.Z. Weed Control Conf.*

SOME ASPECTS OF FOOT AND MOUTH DISEASE

H. G. PEARCE*

INTRODUCTION

WITH all the publicity surrounding the outbreak of foot and mouth disease in Britain last year, and recent events at Warkworth, the farming community must, by now, be moderately familiar with the disease. There are some aspects of foot and mouth disease (FMD) which place New Zealand agriculture in a particularly vulnerable position, and which may not be appreciated. The first is the occurrence of different types of the virus, and the second is the distribution of these different types.

DIFFERENT TYPES OF VIRUSES OF FMD

There are seven types of FMD virus and these types may be subdivided further into subtypes. It is the existence of types and subtypes which makes vaccination against the disease such a difficult problem and, in the case of New Zealand, rules out the use of FMD vaccines in this country. Vaccination against this disease is probably more complex than with any other disease of livestock, and to aid in understanding the full extent of the problem it would be as well to discuss it under several major and minor headings.

PRODUCTION OF FMD VACCINES

The standard method is to grow the virus cultures of living cells, then treat the culture with formalin to destroy the virus. This vaccine is injected into animals to test its potency and safety before it is used in the field.

LIMITATIONS OF FORMALIN-TREATED VACCINES

These confer strong but short-lived immunity to vaccinated animals and inoculation must be repeated at six-monthly intervals. A further complication is that the dose for pigs is about six times that for cattle and sheep and at 45c per cattle dose, this is expensive. Vaccination of the livestock population of New Zealand would cost about $60

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million per year. Apart from the cost factor, the vaccine is severely limited by its effectiveness against only one type, and, as is often found in the field, against a subtype of a type. In practice, the decision as to what virus to use in the vaccine is usually dictated by the identity of the cause of the most recent outbreak. At the moment, it is not feasible to mix all the viruses together and inject the mixture because animals do not become immune to all the members of the mixture.

As far as New Zealand is concerned, because (a) Immunity induced by standard vaccine is shortlived; (b) The formalized vaccine is expensive; (c) The immunity is highly specific, and since it is not possible to predict what virus type or subtype the animals will be challenged by, the use of vaccines in this country is essentially a gamble at very long odds.

THE USE OF FMD VACCINES IN OTHER COUNTRIES

Vaccine is used by some countries because there is no other choice. For example, the trade between European countries in meat, dairy products and living animals is so complex that it is not possible for one European country to have an FMD policy different from its contiguous neighbours. In the case of South American countries, the veterinary services are rudimentary and all the procedures which would need to be invoked to eradicate FMD could not be adopted simply for want of manpower. At the moment, the FAO supplies and administers the use of FMD vaccine in that area. The arrangements for the payment of these services are not clear, but probably it is considered to be a cheap insurance for the western countries to have FMD "damped down". Extensive vaccination is practised in Turkey against South African-type virus in an attempt to erect an immune barrier to the entry of this virus into Europe.

IMPLICATIONS OF VACCINATION

(1) The country which vaccinates against FMD does so with the acceptance of the continual annual costs of the disease, rather than meeting the cost of total eradication.

(2) The country which trades in agricultural products from areas where vaccination is used accepts the risk of periodic outbreaks of the disease, *e.g.*, Britain 1967–68.

VACCINATION IN THE FACE OF AN FMD OUTBREAK

It may be that, to the onlooker, vaccination may be necessary to limit the spread of an existing outbreak, and, in fact, this method of control has been used, apparently successfully, in West Africa. For the method to succeed, it is necessary to have a relatively low density of stock, and the vaccine has to be prepared from the virus isolated from the outbreak. From New Zealand's point of view, this is not feasible because it would take about two weeks to prepare the vaccine, and then there would be considerable time involved in inoculating all the stock in New Zealand. Add to this the time between inoculation and the development of immunity and it can be seen that at least one month would have gone by. During this month, the course of the disease epidemic should have been determined by the eradication procedures and any money spent up to the time vaccination was effective, would have been wasted.

SIGNIFICANCE OF FMD VACCINATION IN NEW ZEALAND

(1) Use of the vaccine is not without risk since the process of formalinizing does not always result in 100% inactivation of the virus and it is possible to introduce the disease in the vaccine.

(2) New Zealand's meat and dairy products, with the possible exception of cheese, would be excluded from markets in North America, Japan and Australia. To be consistent, Britain would have to exclude New Zealand produce in the same way as it has excluded Argentinian meat. The immediate result of vaccination would be the loss of traditional markets, particularly those for meat, and closure of new markets.

THE DISTRIBUTION OF DIFFERENT FMD TYPES

Foot and mouth disease virus types may be subdivided into three main groups:

(1) A. O. and C.: Found in Europe, South America and Africa.

(2) SAT_1 SAT_2 and SAT_3: Found in Africa but also migrating northwards along the eastern Mediterranean countries and at the moment has reached Turkey.

(3) Asiatic Type: Restricted to South East Asia and some parts of Asia Minor.

By far the most important aspect of these groupings is that two groups (SAT and Asiatic) are not yet present in Europe. The FMD type most dangerous to New Zealand has to be the Asiatic because it is as close as six flying hours away. Because this type does not exist in Europe, occurrence of disease caused by it in New Zealand would be much more serious than disease caused by any other type, for the reason that the risk of introducing Asiatic FMD to Europe would automatically cancel out any benefit obtained by the use of vaccines against A. O. or C. types. More importantly, it would be an ideal opportunity for European agriculture to enter the British market almost on its own terms and would probably be a critical factor in speeding British entry into the Common Market.

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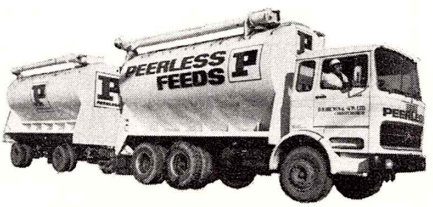

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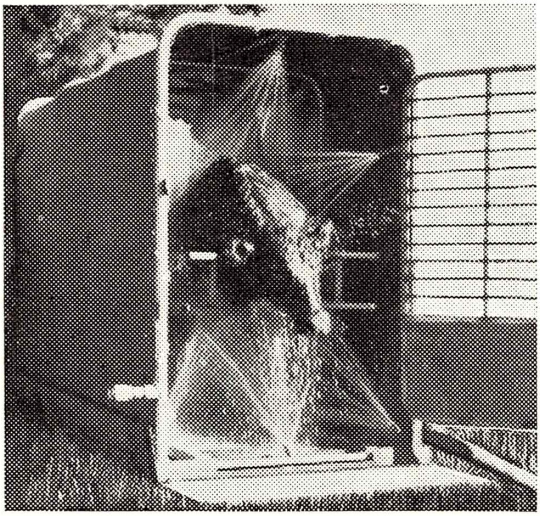

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RESULTS OF A SALMONELLA SURVEY ON NORTH ISLAND SHEEP FARMS

SUMMARY

R. A. ROBINSON*

SALMONELLOSIS as a cause of death was investigated on 141 farms in 18 districts in the North Island over a 12-month period (1966-7). Farmers participating in this survey recorded 13,187 total adult sheep deaths from all causes out of a sheep population of 304,910—a death rate of 4.3%.

During the survey, 1,437 dead sheep were examined for salmonella organisms and 437 were positive. An additional 1,946 sheep died with symptoms considered by farmers to be consistent with salmonellosis. However, for various reasons, it is unlikely that the sampled sheep are a random sample of all animals dying during the 12-month period. The disease was confirmed on 66 farms, the great majority of which lost less than 1% of the flock, although on a few farms losses were as high as 7%. Although most ewe deaths occur during lambing, 85% of confirmed salmonella deaths occured from December to May, inclusive. Salmonellosis appears to be a more important cause of death in younger ewes than in older sheep. There did not appear to be any obvious association with stocking rate per acre and salmonellosis except that few salmonella deaths occurred when sheep were grazing at fewer than five per acre.

Salmonellosis appeared to occur more often in the 6- to 30-day period following congregation, for example, in sheep yards. Salmonella organisms were found in the sheepyards of 66 farms during the survey and in view of the ease with which sheep can be infected during yarding, particularly under dusty conditions, further attention to regular cleaning and disinfection is necessary. Animals exposed to recirculating dip wash can rapidly become infected with salmonella organisms. Widespread contamination of stock water supplies was demonstrated on some farms but only when an epidemic of the disease was in progress. Farmers who bought in sheep regularly each year appeared to experience more salmonellosis. In many instances, cattle were grazing with sheep when deaths from salmonellosis were occurring in the latter. However, no confirmed or suspected salmonellosis in cattle was observed.

* Ruakura Agricultural Research Centre, Hamilton.

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BREAK AND TENDERNESS IN WOOL

G. A. WICKHAM*

THE past two years have seen major changes in the demand for wool. In particular, there has been a sudden fall in the demand for coarse crossbred wool. Associated with the lower level of buyer competition, there appears to have been a tendency for buyers to be more discriminating in their purchases. It has been stated that a high proportion of the stock held by the Wool Commission consists of faulty lines. While concrete supporting evidence is not readily available, neither is there any evidence refuting this statement. There has been much publicity suggesting that breaks and tenderness are major faults lowering the value of the clip but some of this publicity has included misconceptions. There has been very little research on break and tenderness and well-grounded knowledge of the subject is limited. The aim of this paper is to summarize the known facts and present some opinions based on these facts.

DEFINITIONS

BREAK

Wool which exhibits break has a short, well-defined region in the staple which is weak in tensile strength.

TENDERNESS

When used in the strict sense, this term indicates that the wool has a tensile weakness extending over a considerable proportion of the staple. In recent years, the term has been used increasingly to indicate weakness less marked than in break and even as a general term for low tensile strength.

SOUNDNESS

Soundness denotes freedom from break or tenderness.

UNSOUNDNESS

A general term indicating presence of break or tenderness.

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ECONOMIC IMPORTANCE OF UNSOUNDNESS

It is generally assumed that break and tenderness are of major economic importance to the wool-producing industry, but factual evidence showing just how important is limited.

Effects on Price

No adequate survey of the effect of unsoundness on selling price has been carried out. The results of two extremely limited surveys may be worth mentioning. The first, carried out in Australia some years ago, found no relationship between soundness and selling price of Merino wool. The second, carried out by brokers in one New Zealand selling centre in 1966-7, found quite marked price penalties for unsoundness, these penalties being greater for the finer wool. However, these penalties may reflect the Wool Commission's scale of prices for poorer grades of wool rather than the trade's estimation of their commercial value.

Effects on Manufacturing Performance

Since the information on price effects is so limited, it is worth summarizing the likely relation of unsoundness to manufacturing performance. This is a rather complex subject which can be handled only sketchily in the space available. The complexity is due to the fact that the unsoundness can occur at different levels in the staple and in different types of wool that may be processed into a variety of end uses. Different end uses mean different manufacturing processes, and unsoundness is of importance in some forms of processing but not in others. Manufacturing problems result from breakage of unsound fibres during processing and the difficulties of handling short fibres, particularly in combing.

It has been accepted for many years that unsoundness limits the use of wool in worsted processing. Manufacturing trials have shown that lines of wool showing signs of tensile weakness, but not weak enough to be recognized as unsound by buyers, are inferior to completely sound wools in worsted processing. It is generally assumed that unsoundness is not a major limitation in woollen processing where fibre length is not so important.

The relation of level of a break to its economic importance is complicated by several other factors. In long

wools, unsoundness may be of limited importance if the break is in the centre of the staple with sound fibre of adequate length on either side of the break. Unsoundness is probably of greatest importance when about quarter-way along the staple.

From these considerations, it seems that unsoundness is likely to be important in combining wools for the manufacture of worsted yarns but may be relatively unimportant if the wool is manufactured into woollen yarn. Unfortunately, there is little information as to the proportion of New Zealand wool being converted into worsted yarn as compared with woollen yarn. There is evidence suggesting that changes in fashion associated with central heating and heated transport have depressed the demand for heavyweight clothing made by worsted processing of coarse crossbred wools. Competition from cheaper or harder-wearing synthetics has reduced the demand for wool furnishing fabrics. Consequently, an increasing proportion of coarser wool is being used in the manufacture of woollen yarns, in particular for carpet manufacture. From consideration of end uses it would seem that, in future, unsoundness may not be a major problem in wools coarser than 50s. However, it is likely that a greater proportion of the finer wools will go to worsted processing where soundness is more important.

CAUSES OF BREAK AND TENDERNESS

It is commonly stated that break or tenderness is the result of poor nutrition. While this is a contributing factor, it is doubtful if a significant proportion of the unsound wool in New Zealand is due to poor feeding alone. The contributing factors are:

Seasonal Differences in Wool Growth Rate

Sheep fed at the same level throughout the year tend to produce less wool in winter. The slower growth rate is associated with a thinning and weakening of the wool fibres. This seems to be an inherent physiological response of the animal. Individuals and breeds vary in the magnitude of this seasonal response. Merinos appear to have little response, while some other breeds have such a marked response that a break is produced solely as a result of this seasonal thinning. Most Romneys are intermediate between these two extremes and need other predisposing factors before the unsoundness becomes clearly recognizable.

Nutrition

New Zealand pastures have a marked winter depression in growth. Because of the heavy reliance on pasture as a source of fodder, the sheep are normally fed less adequately in winter and early spring than during the rest of the year. This lower level of nutrition results in a further depression in wool growth rate. However, severe undernutrition during winter may not result in pronounced unsoundness if sheep are accustomed gradually to the low level of feeding. It is possible that sudden changes in nutrition may be more important in causing break. Sudden introduction to crop feeding could be a factor.

It has often been stated that increasing stocking rates have resulted in higher levels of unsoundness. In New Zealand, the relation between stocking rate and break has been studied in four trials but in most of these the recording of wool characteristics leaves much to be desired. There is some evidence that in one year there was a substantial increase in break associated with the high stocking rate treatments in the Tangoio trial. Other trials show little if any increase in break. In some Australian stocking rate trials, more complete wool records have been kept. In these trials, marked increases in stocking rate with either Merino or Corriedale sheep have not been associated with increased break or tenderness. It seems that high stocking rates are not necessarily associated with serious levels of break. Possibly, higher stocking rates are associated with management techniques which increase the risk of break. Experience in Massey trials suggests that sheep are capable of producing quite sound wool on extremely short pasture. It is unlikely that the average commercial farmer would ever leave his stock in such sparse grazing conditions. It is possible that adjustments in feeding practice, such as suddenly transferring sheep from short pasture to crop, may be major factors causing break.

Pregnancy, Lambing and Lactation

Ewes suffer a further depression in wool growth from late pregnancy through into lactation. Competing nutritional demands and changing hormone balances may play parts in this depression. Lambing complications probably increase the risk of break.

Other Contributing Factors

Finally, there are a number of factors, not entirely seasonal in nature, which may also contribute to unsoundness. Parasite infection is probably the most common of these and often contributes to production of tender fleeces, particularly in hogget wool. Some other infections can have an even more dramatic effect on wool growth producing an abrupt break. Any factors which impose sudden stresses on animals may also contribute to unsoundness. These include extremes of wetness, cold and possibly psychological factors.

CONTROL

In the absence of research designed to test control measures, it is not possible to make soundly-based recommendations as to how break and tenderness can be controlled. Since unsoundness is due to a reduction in wool growth resulting from the additive effects of several factors, any treatment that will help to maintain wool growth will also help to maintain soundness.

Better winter nutrition is the usual recommendation. While this is effective, the economics of improving winter-feed levels need watching. Reduction of stocking rates has been suggested, but, while this will simplify the winter-feed situation, it is most unlikely to be economic. Saving more hay seems a logical answer but this may not be possible at higher stocking rates. Crops may be of doubtful value because of the risk of inducing break during the early stage of crop feeding. Recent Australian research has shown that feeding diets in which some of the protein has been protected against degradation in the rumen has resulted in marked increases in wool growth. Perhaps this technique can be developed into a control measure for tenderness. Massey trials have shown that the winter depression in wool growth can be arrested by transfusions of cystine, one of the constituents of protein. Periodic injection of this type of substance might also be effective. Avoiding sudden fluctuations in nutrition is probably another important factor in prevention of break.

Maintenance of animal health is another important consideration. Delaying lambing so that nutritional conditions have improved before ewes are subjected to the extra stress of later pregnancy and early lactation could be worth considering in some environments. It is highly likely that a strain of sheep with a less-marked seasonal rhythm of wool grown could be developed by selection.

Unfortunately, this would take considerable time and there is little encouragement for breeders to take on this task.

Shearing times can be adjusted to alleviate the problem of unsoundness. Pre-lamb shorn wools have very good worsted-processing characteristics because they are cut in the weak portion of the staple. However, in some environments there may be management problems associated with pre-lamb shearing. On well-stocked units the winter-feed shortage may be accentuated as a result of increased feed consumption after shearing. Early shearing, when the break is near the base of the staple, seems a desirable practice from the wool-quality aspect. In comparison, late November-December shearing probably results in the break being at the most serious level. Late autumn shearing might also be worth considering since it will result in the thin portion being near the tip of the fibres while the sheep may forage better and grow more wool over the critical period.

CONCLUSION

Unsoundness seems to be of some economic importance, particularly in finer wool. As such, it deserves some attention in farm management. Since it results from several factors, control can be achieved in a number of ways but many of these ways may not be economic. The simplest way to alleviate the problem appears to be by adjustment of shearing dates.

research and the farmer

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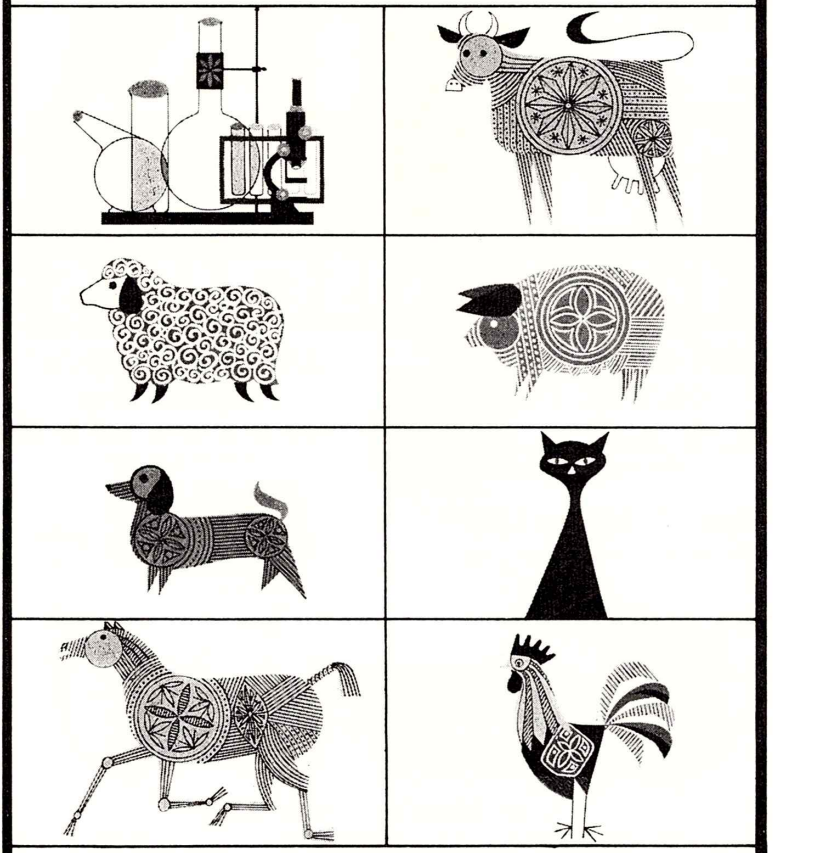

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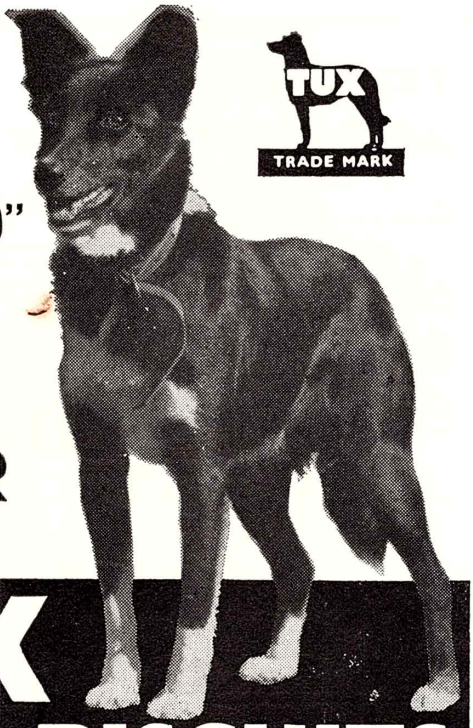

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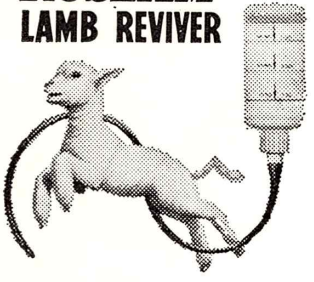

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WOOL FAULTS AND CLIP PREPARATION

T. A. MEEK*

Lack of realism today always means a double dose of it tomorrow. Anon.

WHATEVER type of wool the New Zealand farmers may produce, there must always exist some ideal at which to aim; by striving for, and in the attainment of, that ideal, progress is recorded. However, too often such strivings tends to be measured in terms of monetary values, and if these are small, insignificant, or non-existent, ideals are discarded. Growers tend to discontinue the skirting of wool because, by comparison, it does not pay to skirt; they tend not to class and/or bin their wool because they can see no worthwhile return for doing so. They point out only too often, on the value of someone else's word, that there is, or has been, no incentive to do these things. The result is that the national clip declines in value. The aftermath is that everyone blames the system and not the product.

But how many growers have personally examined the situation in terms of their own product? How many recognize the faults which cause their wool to occupy a low grade in the list of commercial requirements, and set out to eliminate these faults in the hope of increasing their monetary return?

No-one would expect the bulk of the national clip to be in the highest grades, but having allowed for the fact that ewe flocks have a dual function, it should not be unreasonable to expect that growers, by their own efforts, could eliminate much of the wastage which makes up the lower grades in national wool offerings. Maybe there is a need for incentive to do this—incentive such as reward in the shape of increased returns, or incentive in the sense that if something is not done soon, there will be no place for incentive.

COMMON FAULTS AND POSSIBLE REMEDIES

Decline in style is due solely to increase in faults, and faults are defined as being (a) hereditary and (b) acquired. Perhaps in order that synthetics should not

* Massey University, Palmerston North.

establish complete monopoly over the term, either or both of the above faults could be plainly labelled "man made".

To raise the style of wool, faults should, wherever possible, be eliminated. This may be achieved by changes in breeding, feeding, or preparation.

Without doubt, unsoundness of staple, *i.e.*, break or tenderness, is the cause of greatest financial loss to the New Zealand grower. Not only does the prevalence of this fault prevent wool from reaching the highest (and most remunerative) grades, but its effect in the production of other faults is immeasurable. Unsoundness or lack of tensile strength is usually attributed to prolonged ill health of the animal or sustained low level of nutrition. Is there any other factor which contributes to unsoundness? Has, for example, the coarsening of the clip helped to produce more tender wool? On the assumption that the style of the clip has dropped with the coarsening, this could well be true. The coarser the fibre, the greater the sustenance required to nourish it. Is tenderness a contributing factor to other faults? The fibres in a tender fleece will break quickly under strain and so the perfect situation for cotting is created. Cotting cannot occur unless first shedding or breakage of fibres from the skin takes place.

The coarsening of the clip is responsible for a marked increase in tippy wools, bringing in "brittle tips" or increased loss when machining for textile production takes place. A questionnaire to brokers showed that from Auckland to Invercargill tippy wool was regarded as a serious fault—"The biggest concern to us here"; "variation in fibre length . . . makes up the greater proportion of wools passing through our stores"; "hairy tip in crossbred wool"; "are still very prevalent . . . becomes noticeable where badly-bred Romneys are crossbred with badly-bred Borders"; "bad breeding results in brittle hairy tips"; "plain lashy tip is common . . . mainly due to bad breeding of coarse Romney-type sheep".

If irregularity in fibre length within the staple is a bad fault, how much worse is the mixture of lengths which can occur within ungraded clips. Regularity of staple length in crossbred classings is essential for today's market. Once required from Merino clips only, it is now a requirement for all wools, including shear wools. Colour faults are somewhat easier to assess and define, mainly in terms of the fastness of the colour and its relation to scouring.

STYLE GRADINGS

To assist in commercial grading and valuation, a system of style grade descriptions has been evolved and each grading is designated by letters or combinations of letters. The letters used are BB, B, B/C, and C, and are not in any way related to letters as used in bale descriptions, *e.g.*, A Med. X Bred, B Ewe, etc. They merely indicate the degree of excellence or presence of fault(s) in fleece wool. For example, C grade is much more faulty from a manufacturing point of view than B grade and so BB would possess greater excellence in every way that B. In after-sale press reports, such gradings may be interpreted from the descriptions given below.

Good/Super BB: Good colour, well grown, well skirted, free or practically free from seed; must be basically sound and are therefore virtually fault-free wools. To obtain a BB grading, fleece wool should display a certain amount of evenness of quality, length, and condition, or, in other words, be classed, as well as show definite character or breeding by way of crimpiness.

Associated faults: Slight dust, slight tenderness and little else.

Good B: Fair to good colour, skirted; may contain the odd soft cott and/or very slight seed. Fleeces graded as B are quite different from those in BB category as most are quite plain in appearance or lacking in crimp. Soundness is not necessarily a strong point as may be noted by the allowance for the odd soft cott (webby wool) which is always an indication that the wool is not sound. Buyers prefer cotts to be in lines on their own, as provision is made for these in a special trio of gradings, good, average, and inferior. Interpretation of fair to good colour would be that such colour, *e.g.*, dust, would disappear during scouring.

Associated faults: Dust, light log stain, showing condition, tender or break, tending to cottedness, some seed, some variation in both quality and length.

Note: The presence of any one of these faults could cause a fleece to be graded down from BB to B.

Good/Average B/C: Similar to B grade except that faults are more noticeable and skirtings may be present. The great bulk of New Zealand wool falls into B and C grades and B/C is therefore a halfway house; some of the better or less faulty unclassed clips go into this grade rather than to C grade.

Associated faults: Skirtings light seed, various discolorations, sand dust, log stain, yolk stain, pen stain, condition, variation in quality and length, britchy and/or hairy.

Average C: Fair colour, may contain few cotts and may be unskirted and part seedy. Colour in C grade wools is usually unwashable or fast to scouring, or, as in heavy log stain, will leave the fibre in a damaged state when the colour is removed. A considerable quantity of wool is graded C on account of colour alone, whereas other factors, *e.g.*, soundness and general character, would warrant its inclusion in higher grades.

Associated faults: Canary stain, water stain, dip stain, heavy sand, dust or log stain, skirtings seed, heavy condition.

It should be stressed that some faults may obscure others to the extent that the presence of a second fault may not be noted when the wool is in the greasy state. Dust, or even log stain, both of which are largely scourable, may, when removed, reveal that a colour fault of greater intensity, *e.g.*, canary stain, is also present; in such case, wool which had been graded as B/C prior to scouring would be downgraded to C after scouring.

HINTS ON CLIP PREPARATION

In cases where for various reasons, a grower markets the fleece portion of his clip "all in", *i.e.*, with no further handling by the broker other than stacking or displaying, the following notes will be of some assistance.

Never mix breeds.

Keep out cotted and matted fleeces; these are graded under separate style gradings and little provision is made for the inclusion of such in the general fleece style gradings.

Keep long and short wools separate, *e.g.*, two-tooths from older sheep. The demand for evenness in length in crossbred wool is greater than ever before. Careful drafting could assist here.

Keep out those fleeces which vary in colour from the bulk of the clip; some may be scourable, but many colorations, artificial or environmental, are fast to scouring, and will lower the style gradings. Where patches of staining occur, these may be skirted out, but if in doubt keep the whole fleece out. Common stains which are of importance in manufacture are pen stain, urine stain

(in bellies), water stain, stains emanating from foot rotting or drenching fluids, canary stain, yolk stain.

Keep out hairy, badly-bred, or plain metallic looking fleeces, especially in lambs' wool.

When picking lambs, make sure that all fribs are separated from the body wool. Do not mix short body wool and fribs; keep each separate.

Watch the weights when pressing; overweight bales can be costly.

Brand bales correctly, and ensure that specifications conform to the brands on the bales.

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THE WOOL MARKETING STUDY GROUP REPORT

B. P. PHILPOTT*

INTRODUCTION

I am pleased to have the opportunity to discuss this topic, if only because it seems important that farmers should have a clear-cut, uncomplicated explanation of what this report is all about, since it is very apparent that few people *have* in fact read it, though this does not appear to have inhibited, in any way, the virtual spate of criticism to which it has been subjected by farmers, farm organizations and wool traders alike.

My first job, therefore, is to explain what the report is about; my second to appraise some of the major criticisms which have been offered; and, lastly, I want to offer my own view of the whole matter.

I find some difficulty in deciding in what guise I am discussing the Report. I was, as it happens, a member of the Study Group in the first two years of its work, but was overseas during 1967 when the Report was written. Nevertheless, had I been here, I would have signed it without reservation.

I suppose, therefore, I speak as a quasi-member of the Group, prepared to defend the work to which I contributed. If one were to go by some of the epithets used by the more violent critics of the Report, one would not regard it as an honour (as I do regard it) to have served on this committee.

One critic (with the usual penchant for finding great virtue in the practical man's ability to dissect highly complex theoretical issues) has complained about the "theorists" on the group; another talked of "intellectuals" and a third military-minded critic has spoken about the "army of economists who have infiltrated the wool trade".

So you can take your pick, and assume that I speak as an "intellectual", a "theorist", an "economist", or whatever; in fact, I speak as a university man deeply concerned about the welfare of New Zealand and of the wool industry. I would not want it to be regarded as boastful if I also mention that I am a Professor of Economics who, as it happens, *has* soiled his hands with practical affairs in the wool trade. In fact, I am proud to say that I hold a wool diploma from Massey University and had chalked

up considerable practical experience long before I became a "theorist" and an "economist". It was to some extent out of a feeling of despair with the frequent obtuseness and blind conservatism of good practical men in the wool trade (from which, incidentally, I believe it still suffers) that I left it for the university. Lastly, I think I should remind you that the university has in this matter no axe to grind and no empire to build. Its job is to find and disseminate truth, and this is something one cannot always be sure of with all the critics of this report.

THE WORK OF THE STUDY GROUP

The Study Group was set up in December, 1964, by the N.Z. Wool Board and the N.Z. Wool Commission, largely in response to the interest displayed by farmers and others in the problem of price fluctuations and the harm this was doing to the demand for wool (the 1963-4 season saw wool prices reach boom levels and had encouraged the entry of cheaper synthetics for which we are now paying dearly).

The terms of reference of the Study Group were:

(1) To investigate the causes of price fluctuations in the present wool marketing system and report on any suggested method of containment, within the existing system.

(2) To report on methods of wool marketing.

(3) To report on any other matters relating to wool marketing that in the opinion of the Study Group should be established.

Hence, while the first term of reference dealt with fluctuations that were the motivation of the setting up of the Group, the additional terms of reference gave the Group a wide charter on matters relating to wool marketing.

In tackling these problems, the Group did not sit around the table and talk about them but all members, especially the "theoretical economists," involved themselves in a detailed statistical examination of the issues involved, and in extensive surveys of opinions from wool growers and other people and institutions concerned with sheep farming; from wool brokers, wool buyers and others concerned with the wool trade; and from local and overseas

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* Professor of Agricultural Economics, and Director, Agricultural Economics Research Unit, Lincoln College, Canterbury.

wool users. The survey of overseas wool users involved detailed investigation by an overseas commercial research firm and covered wool textile firms in the six most important wool-consuming countries.

The results of this vast amount of work are given in detail in a number of special papers published by the Group* to which singularly little reference has been made by the critics of the Report.

These detailed conclusions, and the thoroughgoing analyses which led to them, are summarized in the final Report of the Group. It is convenient at this point to mention these conclusions briefly under the headings of Causes, Effects, and Containment of Fluctuations.

THE NATURE AND CAUSES OF FLUCTUATIONS IN WOOL PRICES

The Group examined in great detail the course of wool prices for the last decade, in many cases sale by sale and type by type. It is quite clear that wool prices have fluctuated much more than synthetic prices; that there have been wide fluctuations from season to season in the margins of fine and medium wools over coarser types; that there are often great fluctuations in levels and margins over the course of *one* sale. Because of these factors, different growers' returns for the same type and style of wool were subject largely to the particular sale chosen or the particular time of the day at which their wool was sold. This, in my view, is not only quite inequitable but is not conducive to efficiency.

As to the causes of fluctuations, the Group conducted a number of research studies and also collected a vast amount of information on this matter from the surveys it conducted. It is fair to say that there is still a lot more research work needed on this question before a definitive statement can be made as to the causes of wool price fluctuations.

It is of course a truism—and a very well worked one—that wool prices are determined by supply and demand. But the Report is careful to point out that different supply and demand factors are at work over different periods of time.

In the long run, the changes in long-term trends in wool prices bring about an equilibrium between the supply of wool and the demand for wool textiles, as determined by world population, consumers' incomes, tastes and

* A list of these special reports is given at the end of this paper.

fashion, prices of competing textiles, costs of producing wool textiles, etc. These are the fundamental determinants of the demand for wool and no marketing scheme or tinkering with market arrangements can yield prices higher that those required to clear the market in this sense.

But the supply-demand equilibrium in which the Report is most interested is that implied over shorter periods of time, say, sale by sale, and yielding the violent short-run fluctuations in prices mentioned earlier. These, the Report suggests, are caused by a number of factors of which the most important are demand factors as follows:

(1) Consumer demand is accelerated by textile-stock changes by the time it reaches woollen mills.

(2) Woollen mills and traders also tend to magnify these changes by holding greater or smaller levels of stocks of wool.

For example, most of the cyclical decline and subsequent upturn in wool prices in 1958-59-60 was due, not to changes in consumer demand for wool textiles, but to considerable changes in the level of stocks of wool and wool textiles at various stages in the pipeline. There are undoubtedly also at work strong influences on wool prices springing from the fact that all traders are having to base their current actions on expectations about the future level of prices with all the associated problems of uncertainty, market sentiment, rumour. For example, I consider it very likely that the rising level in prices experienced in New Zealand in February and March of this year was due to rumours of a possible devaluation of the U.S. dollar against gold. When it became evident that, for the present at any rate, this was not going to happen, prices slid down again in April and May.

THE EFFECTS OF PRICE FLUCTUATIONS

The section of the Report dealing with the effects of fluctuations is based mainly on the results of the surveys conducted by the Group.

As far as growers were concerned, it was concluded that fluctuations in wool prices did have a harmful effect in that they led to erratic and badly planned and often wasteful farm development. Furthermore, it was almost impossible for growers to gain a clear view as to the relative profitability of growing different qualities or grades of wool and of devoting considerable attention to careful

classing and preparation for sale. If there are any premium paid by the market for such things, then they are well submerged in the constant fluctuation in the general level of prices and no clear guiding signal is thus provided to the grower as to what he should do. As regards users of wool, the Report quotes specifically that, of the 263 overseas wool textile firms surveyed, 86% stated that they would welcome greater stability of raw wool prices. It is important to note that the firms who preferred stability were users of tops and yarn, whose profits are earned from the job of manufacturing good wool textiles. These firms derive no benefit from fluctuating prices and the only beneficiaries, especially in a situation like the 1964 wool boom, are the producers of synthetic fibres whose prices are stable, at least over long periods of time.

Those firms who were less emphatic in this regard were merchants and topmakers whose profits come largely from the speculative operation in buying wool at better rates than their competitors, and in outguessing the market in general rather than from the processing and manufacturing margin earned. Such operators only too naturally preferred fluctuating prices as this is the main basis of their business.

THE CONTAINMENT OF FLUCTUATIONS

With the evidence that greater price stability to the user would be desirable, the Study Group then turned its attention to methods of securing such stability. Given that the major reason for short-term fluctuations stemmed mainly from short-term changes in demand, especially in inventories over which little control could be exercised, the logical approach was to consider a buffer stock arrangement whereby the fluctuations in demand were absorbed in fluctuations in stocks held by the buffer stock rather than in prices.

But desirable as this may be, it was soon evident that the capital required to do this would be too large to be considered practical—a result which stems largely from the fact that, as things are at present, New Zealand would have to "go it alone" in such a buffer stock approach which would be much easier if a joint approach by all main producers were adopted.

Attention was therefore concentrated solely on schemes aimed at providing stability for growers alone. This, it was concluded, was quite possible, practicable, and not too costly, by adopting a type of national pooling scheme,

or the use of a stabilization or buffer fund. This fund is referred to later in a discussion of the Report's recommendations on containment.

RECOMMENDATIONS ON WOOL MARKETING

After careful consideration of a number of alternatives, the Group came to the conclusion that the auction system is still the most efficient method of handling and marketing two million bales of wool and it recommended the retention of the auction system. Nevertheless, it also suggested a number of improvements in marketing procedures aimed at improving the image of wool in the eyes of the buyer and consumer, especially by way of introducing a degree of quality control so important with synthetic fibres.

These improvements, the details of which will not be discussed here, include:

(a) Improvements in classing and grading.

(b) Development of a more accurate scientific method of assessment of wool properties and faults.

(c) Development of a smaller number of standard New Zealand types.

(d) Development of the display of representative samples rather than whole bales.

The Wool Board and the Wool Commission agreed to these proposals and a research project to develop the necessary testing instruments and procedures has been set up at the Wool Research Organisation.

The Report pointed out also that there was an urgent need for market research and market intelligence systems. It has always been a disgrace that in a $200 million industry, like the New Zealand wool industry, nothing, or virtually nothing, should be known about such things as the end uses of the wool and the ultimate purchasers of it, both by country and type of textile product; what faults are found in it; what opportunities exist for substituting our wools for other types; what are the trends in retail buying of wool products in general and of products made from our wools; what factors influence consumers' buying; what response there has been to the massive promotion expenditure of the I.W.S. to which New Zealand contributes.

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* *e.g.*, the private wool buyers, as reported in their statement in the *Press*, Christchurch, June 10, 1968.

Some critics* doubt the need for market research and a market intelligence service and point out that the eighty wool buying and merchanting firms operating in New Zealand have their own market intelligence spread throughout the world and reports come in literally by the hour. If this statement were confined to cables about the state of the current market for wool and tops and instructions as to buying limits, I would agree with the point of view expressed, but this is not marketing intelligence as the Group discussed it. It is absolute rubbish to imply that the wool merchants in New Zealand have a clear day-to-day picture of the state of overseas retail trade in crossbred wool textiles or even that many of them have the faintest idea what our wools are used for.

No respectable business or group of businesses overseas selling a product of the value of wool, or even a tenth of this value, would dream of operating with the paucity of market information which is found satisfactory in New Zealand. Synthetic producers deploy vast resources in market research by comparison with which the Study Group's suggestions are very modest indeed.

The proposals for standardized grading, quality control, etc., and for the development of market research and intelligence, the Group considered best implemented by setting up a wool marketing authority which would be responsible for the setting and maintenance of standards, and the guaranteeing of the specifications of wool sold by sample.

There is one final comment to be made about the improvements thought necessary in the auction system. This concerns the problem mentioned before of the inequity in prices received by growers of comparable wools, either between sales within a season or within a single sale, so the premiums and discounts for style, quality preparation, etc., are obscured by random price fluctuations. The suggested means of rectifying this are contained in the Group's recommendations on stabilization.

RECOMMENDATIONS ON GROWER PRICE STABILITY

To deal with the problems and improvements so far mentioned, and also to provide a degree of stability to growers, the Group recommended the introduction of a system of marketing as follows:

(1) Appraisal and purchase by a Wool Marketing Authority of all wool produced in New Zealand at prices stable

throughout any one season and relatively stable between seasons.

(2) Sale of wool by the Authority through existing channels of disposal, with the auction system as the major method.

The scheme recommended would operate as follows:

(a) At the beginning of the season, the Authority would announce a bareme of appraisal prices for the ensuing season for all greasy, scoured and slipe wool produced in New Zealand.

(b) The Authority would then appraise and pay out on all wool offered for sale in brokers' stores for those growers who chose to sell in this way, or in merchants' stores if growers preferred private sales. In this way, growers would retain the right to offer their wool under their own brand.

(c) The Authority, as owner of the wool, would have the right to decide where, when and how the wool was to be sold and in what form, and could regulate flow of particular types on to the market.

(d) The Authority would have the power—at present possessed by growers—to pass the wool at auction at reserve prices which could be flexible throughout the season, but this of course would have no effect on growers' payout.

(e) Thus at the end of the season all growers of similar types, styles, qualities and degrees of preparation, would receive the same payout price. If the sale receipts exceeded the payout price the excess would be put to reserve to finance deficits in years when the opposite situation applied, with the general aim of having a self-balancing scheme over the long run.

(f) The setting of the bareme of payout prices for each type at the beginning of the season would proceed in the light of:

(i) The state of reserves of the authority.

(ii) The current and future supplies of and demand for each particular type of wool.

(iii) The degree of between-season stability required.

(iv) Assessments of current and future trends in wool and other textile fibre prices.

Alternative and practicable methods of setting the average payout price each season based on an exhaustive piece of research were suggested. They all amount to attempts to reproduce, in growers' payout, something approaching the long-term average trend in prices which I suggested earlier was desirable.

In essence, then, what the Report proposes is the retention of the present selling channels, but for growers' wool to be sold by a national growers' co-operative with a payout based on the style, quality and preparation of wool produced, and on the general state of the market over the recent run of seasons, rather than on the day-to-day vagaries of this very volatile market.

CRITICISMS OF THE REPORT

These fairly simple, clearcut and, one would have thought, unexceptional proposals, have brought forth a flood of criticism from members of the wool trade and farmers alike. I have examined all the published sources I can find and listed all the objections raised over the past few months. I must say that at the end of such an exercise it is difficult to establish just what are the substantive and objective criticisms which have to be met.

There have of course been the usual violent emotive outbursts from farmers and growers alike, using such terms as "socialization", undemocratic", "selling wool under social security", "interference with the natural laws of supply and demand", etc. Many Federated Farmers' branches have passed resolutions opposing the report, but as they rarely give reasons for their opposition one cannot, nor can one be expected to, deal with their objections which I assume are based on emotion rather than argument. Certainly this must be the case with one Federated Farmers' leader who has declared "open war" on the report.*

At a more responsible level, many farmer leaders†, and some wool merchants, have expressed justifiable concern about the establishment of a wool authority, seeing in this the danger of government control and the introduction of dictatorial bureaucratic power. It is only fair to point out in this connection that it is impossible to

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* The President of North Canterbury Federated Farmers, as reported in the *Press*, Christchurch, March 30, 1968.

† A. C. Begg, Senior Vice-President of Federated Farmers, in the *Press*, Christchurch, March 28, 1968.

have any form of national uniformity in grading and typing, any form of quality control etc., without some form of national authority. After all, the Meat Board is a national authority responsible, amongst other things, for uniformity in grading, at which it has been successful without attracting the sort of criticism mentioned above.

Nor can there be any justifiable complaint about the costs of operating the authority. At one point in the Report, some estimates are given of the costs of additional appraisers and administration which amount to only about one-fiftieth of a cent per lb of wool produced in New Zealand.

There are next a number of people who have criticised the proposals on the general grounds that they involve interference with the free flow of wool and free play in prices of the forces of supply and demand.

Such statements have appeared as:

"New Zealand supplies 12.2 per cent of world production so how can we dictate world prices?"[1]

"Changes in authority's price level would create uncertainty in the trade and hand to mouth buying."[2]

The I.W.T.O. passed a resolution "regretting these proposals because of their interference with the free flow of wool."[3]

"Interlaine the EEC Wool industries' committee has strongly opposed . . . the establishment of supply management."[4]

"To interfere with the free flow of any commodity is dangerous and can result in disruption in trade."[5]

The author of this last statement also said with refreshing candour, "I haven't had much time to study in detail the recommendation but what I have absorbed I don't like." I feel this remark ought to have been made by all the authors quoted above for the fact is that *the whole tenor of the report is against supply control and interference with the open market price of wool.* The comments have therefore been made either in ignorance

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[1] Statement of private wool buyers—the *Press,* Christchurch, June 10, 1968.

[2] Statement by B. P. Hill, President, N.Z. Woolbuyers' Association, to Economic Society Meeting, April 23, 1968.

[3] Statement by D. L. Ambler, Wool Buyer, in the *Press,* Christchurch, February 14, 1968.

[4] Statement in Christchurch, February 21, 1968.

[5] F. Whiteley, Woolbuyer of Bradford, reported in Borthwick's *Bulletin,* April, 1968.

of the true contents of the Report, which is deplorable, if unsurprising, given the vested interests represented, or they have been made with the clearcut purpose of influencing the views of grower organizations and in this they have certainly succeeded.

It is true that the Report recommends that the Authority would have power to regulate flow of various types (*e.g.*, lambs wool) on to the market over the season but this was in fact the subject of a recommendation by the Buyers' Association and in any case could hardly count as supply management in the sense to which the above objections apply.

Perhaps the critics also construe as supply management the Group's recommendation that the Authority would have the power to pass wool at auction if it deemed this desirable. But surely this is simply taking over the existing right of growers to put a reserve price on their wool and withdraw it from sale—and frankly it would be far more efficient than the usual practice at present of advising growers to set reserves "at about last week's sale less 5%". To forfeit that right would be to capitulate completely to the time-honoured but in my view worn-out wool trade adage "sell and repent but sell".

It is, as it happens, most unfortunate that much of the criticism of the report in this context of supply management is inextricably mixed up with discussions and criticism of the floor price operations of the Wool Commission and it has suited some people's book to cloud the basic issues in this way and they have certainly succeeded in view of the number of Federated Farmers' resolutions on this matter.

It is appropriate to say a word or two about the Wool Commission, even though it is only indirectly related to the topic of this paper. A typical comment on the Wool Commission which has been echoed up and down the country is this from the unflagging pen of D. L. Ambler, a woolbuyer of Christchurch:

> What we do object to, however, is any marketing and/or reserve price scheme which prevents us having access to your wool even when we are prepared to pay the ruling world price. The supreme example of this, of course, was last season's fiasco when an unrealistic and inflexible price scheme resulted in 700,000 bales of your wool being denied

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* The *Press*, Christchurch, February, 1968.

to potential customers, and instead finishing up unsold and accumulating vast charges in interest and storage.*

Those, like Mr Ambler, who find it disagreeable that 700,000 bales of wool should be held in stock need to reflect on, and indeed, refute, one or two important propositions as follows:

(1) Were the potential customers, whom it is said were denied the wool, wool-consuming firms who would have increased their output and sales of wool textiles—or, in other words, would mill consumption have been higher if prices had been lower? I suggest this was unlikely in view of the general recession in *all* textiles in 1967.

(2) In that event, the wool would have gone into stock and it is the stockholding merchants who were the potential customers denied access to wool.

(3) Had they not been held by the Commission, these stocks would now be on offer throughout the world and would be having just as depressive an effect on wool prices as the Wool Commission stocks are *reputed* to have.

(4) In fact, the Wool Commission can afford to be a much stronger holder of stocks than private merchants and release them slowly over the next few years.

When the Wool Commission announced recently that it would sell up to 100,000 bales during the normal sales next season, a great howl went up from the trade and growers alike, and it was averred that this announcement was the direct cause of the fall in wool prices which occurred at the next succeeding auction sale. I suggest that these two events were quite unconnected, that the fall in wool prices was due, as mentioned earlier, to traders' anticipations about gold prices and U.S. dollar exchange rates; and, indeed, on futures markets, wool prices were falling before the announcement was made. But it suited people to link these events together as part of the general attack on the Commission.

This attack, while inexcusable, is, as far as wool merchants are concerned, quite understandable; the attack by Federated Farmers branches leading to resolutions of "No Confidence" in the Commission I find quite disgraceful.

In any event, I suggest that judgment on the buying in of 1967 be suspended until the whole operation, including

disposal of the stockpile, is complete, because only then can rational and dispassionate judgment be made.

AN OVERALL APPRAISAL

From the review of criticisms of the Report given above, it is clear that most of them are based on ignorance of the contents of the Report, prejudice, or on vested interests. I find little constructive substantive criticism other than that prices should be left to the free play of supply and demand. I see no reason to amend my full support of the Report.

Were I to try to sum up in one paragraph the philosophy of the Group's thinking on wool marketing, it would be that it saw, quite rightly, the ideal marketing system as a communication system transmitting from consumers to growers information via prices, as to the sort of wools required in greater quantities, the grading systems preferred, the types of faults which consumers found very costly and which it was worth while trying to eradicate, and those faults which could be tolerated, the preferences of the trade for different qualities and styles, etc.

In theory, prices set by supply and demand ought to do just this. But in fact they do not. The communication system breaks down. Ask any wool trader about the worthwhileness of some change in a wool policy, and his answer will almost surely be refuted as many times as it is supported by the evidence of the wool sales.

Seeing areas where the communication system had broken down, the Study Group produced proposals to improve it in areas where small changes could do this, *i.e.*, in growers' payout procedures, while eschewing those aspects, such as the price to consumers, with which it felt it impracticable to interfere.

I repeat that I attach the utmost importance to the recommendation to start a programme of market research on crossbred wools.

The whole matter has been put most succinctly by one enlightened Federated Farmer spokesman* who has said that the New Zealand wool industry, like any other industry, must be thought of as having three divisions. The production division *(i.e.*, the New Zealand farmers) has achieved spectacular levels of efficiency. There is also in the I.W.S. an efficient promotion and advertising division. But so far there is no marketing division and until one exists it cannot be said that the wool industry

* The *Press*, Christchurch, March 28, 1968.

is geared to meet the challenges it faces. The industry should not be satisfied until it has a marketing organization which, like that possessed by its competitors, allows it to get out and find out, in a way it has never done before, what the consumer wants, and then go ahead and produce it.

In conclusion, I quote from A. Begg, Senior Vice-President of Federated Farmers, and a stern, and objective critic of the Study Group Report. He has said: "As woolgrowers we do not claim to be intellectuals but nature has compensated by endowing us with a certain low cunning." *

I think that is right, and, moreover, I would not confine the statement to woolgrowers but include most of the wool trade. But whereas low cunning has served extremely well in the last 100 years, I doubt if it will be an adequate substitute for intelligence, at any rate in marketing in the next decade or two, and I regard the Wool Marketing Study Group as having made some contribution to effecting the very necessary transition.

WOOL MARKETING STUDY GROUP PUBLICATIONS

Report No. 1: Wool Price Fluctuations, August 1965.

Report No. 2: Review of Work Undertaken, July 1966.

Submission Paper No. 1: Fluctuations in the Price of New Zealand Wool 1952—1965, by Professor W. V. Candler, May 1966.

Submission Paper No. 2: Cycles in British Wool Consumption, by Professor B. P. Philpott, D. M. Beggs and M. W. Calder, May 1966.

Submission Paper No. 3: Analysis of Trends and Fluctuations in Wool Prices, by Professor B. P. Philpott, May 1966.

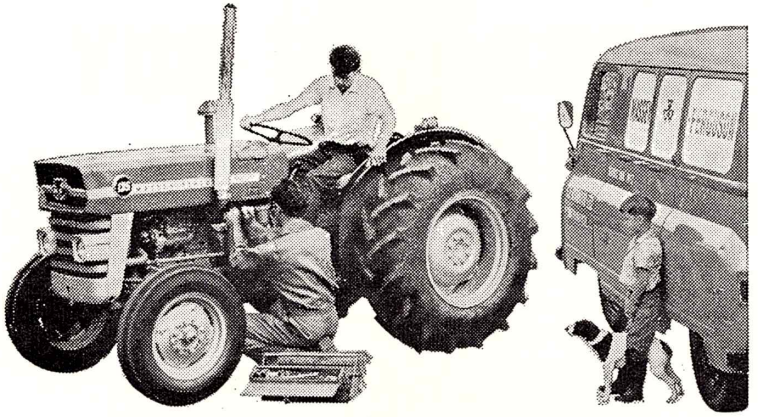
Submission Paper No. 4: Analysis of the Distribution of Lot Sizes at New Zealand Greasy Wool Auctions, by H. L. M. Peirse and D. M. Beggs, May 1966.

Submission Paper No. 5: The Even Distribution of Wool Categories throughout the Selling Season, by H. L. M. Peirse and W. B. Taylor, May 1966.

Submission Paper No. 6: Price Movements of New Zealand Wools and Related Futures, Tops and Yarn Prices, 1952—1965, by Professor W. V. Candler, November 1966.

Submission Paper No. 7: Proposals for Improving Handling, Classification and Marketing of Wool in New Zealand: Part 1—A Comprehensive Scheme; Part 2—Standardization of Wool Types, by Dr I. E. B. Fraser, March 1967.

* The *Press*, Christchurch, March 28, 1968.



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A COMPARISON BETWEEN BEEF-BRED AND DAIRY-BRED STEERS FOR GROWTH AND CARCASS CHARACTERISTICS—TRIAL IV

R. A. BARTON*

IN a previous report (Barton, 1966) the results of three trials were given in which Aberdeen Angus, Hereford and Friesian steers were compared. It was shown in those studies that the Friesian has the capacity to grow more rapidly than the two beef breeds and is able to produce lean beef of the kind keenly sought after by meat exporters.

In the trial to be discussed here (Trial IV), steers of five breeds or crosses were compared for their growth rate and carcass characteristics. These groups were: Aberdeen Angus, Hereford, Friesian, Friesian-Jersey cross and Charolais-Jersey cross. This project was part of the national programme to examine the value or otherwise of the Charolais when crossed with the Jersey cow.

The Charolais breed was evolved in France. It is very muscular and large in size, white to creamy in colour, and horned (Barton, 1964). Semen from several bulls of this breed was imported from England. It was obtained from Charolais bulls bought in France and now located at artificial insemination centres operated by the Milk Marketing Board of England. Charolais semen was made available from this source for research purposes at three centres in New Zealand: Ruakura Agricultural Research Centre, Hamilton; Massey University, Palmerston North; and Lincoln College, Canterbury. At the two first-named institutions, it was used on Jersey cows, but, at Lincoln College, Friesian cows were inseminated with Charolais semen.

SOURCE OF CATTLE AND THEIR REARING TO WEANING

The Aberdeen Angus and Hereford steers were purchased in the autumn of 1967 as weaners. They had been single-suckled on their mothers and came from two nearby hill country properties in Hawke's Bay. The calves were selected as being representative of each line of weaners from both farms.

* Massey University, Palmerston North.

The Charolais-Jersey cross calves were born on the Massey University dairy farm. Six of the Friesian calves were purchased from two outside herds and the rest of this group were born at Massey. All of the Friesian-Jersey cross calves were obtained from two nearby properties. These calves were bought at 2 to 4 days of age. All calves were born during late July and early August 1966.

The dairy-bred calves were fed warm whole milk at the rate of 3½ pints per calf per feed twice daily for the first two weeks away from their dams from whom they had obtained colostrum. Over the following four days, the calves were changed gradually to a reconstituted buttermilk diet. The buttermilk was reconstituted by mixing 2 lb of buttermilk powder with 10 lb of water. The calves were given 7 lb of this mixture for the next two weeks and their daily consumption of it was increased to 10 lb by the time the calves were four weeks old. From three weeks of age the calves were fed once daily. The calves were weaned at 10 weeks of age. After being housed for the first week, the calves were run on good-quality pasture in groups of 15. Hay of good quality was available to them at all times.

Calves which scoured were isolated and given warm water in place of milk or the liquid milk substitute. When scouring was arrested, the calves were returned gradually to milk feeding. Scouring calves were also dosed with "Strinacin" tablets.

The calves were tested for tuberculosis (with negative results) and were vaccinated against blackleg, malignant oedema and leptospirosis (*Leptospira pomona* and *L. hyos* (*mitis*)). They were drenched to control stomach and lung worms and dusted to kill lice. They were dehorned with the caustic potash stick at about four weeks of age and were castrated when about eight weeks old.

REARING FROM WEANING TO SLAUGHTER

In the second week of November, 1966, the dairy-bred calves were transferred to the Massey University Terrace sheep farm where they were grazed in paddocks which sometimes contained sheep.

The comparative trial commenced on April 3, 1967 when the bought-in beef-bred weaners arrived at Massey. All breeds and crosses were then mixed and made up into mobs of a suitable size for the various paddocks. The mobs were not larger than 10 animals. The weaners were

transferred on July 7, 1967 to a hill paddock at the Massey University Tuapaka farm and wintered there as one mob on grass and hay. On September 3, 1967 the cattle were returned to the Terrace farm and sorted into small mobs each containing at least one beast of each breed or cross.

In the autumn of 1968, dry conditions were experienced and hay was fed to supplement the small amount of pasture available to the stock. Following rains, the pasture was heavily contaminated with the fungal spores causing facial eczema and it was therefore necessary to confine all the cattle on a bare paddock and feed them hay.

The animals were drenched against internal parasites and were treated for lice subsequent to their arrival on the sheep farm.

DATA COLLECTED

The cattle were weighed at frequent intervals.

A random sample of each breed or cross was slaughtered at the C.W.S. freezing works, Longburn, on April 19, 1968. Data were obtained on various carcass characteristics and these are listed in Table 1.

RESULTS

Liveweight Growth

The curves of liveweight growth for each breed or cross are presented in Table 2. From an inspection of this table, the superiority of the Friesian in its rate of growth is obvious. The Charolais-Jersey gained rapidly especially over the last 6 months of the trial and the Friesian-Jersey cross was the next fastest in terms of its growth rate. The Hereford was fourth and the Aberdeen Angus was last.

Production and Carcass Data

Data obtained on the carcasses of the cattle and their mean liveweights at the start and end of the 381-day test period are given in Table 1.

The figures in Table 1 show that the Herefords had the heaviest carcasses, followed by the Friesians, Charolais-Jersey cross, Friesian-Jersey cross, and, in last position, the Aberdeen Angus. The dressing-out percentage (*i.e.*, carcass weight as a percentage of liveweight at slaughter) was highest for the Hereford steers and lowest for the Friesians. Even though the Friesians were heavier at the last weighing before the cattle were killed, they did not

TABLE 1: LIVEWEIGHT AND CARCASS DETAILS OF ABERDEEN ANGUS, HEREFORD, FRIESIAN, FRIESIAN-JERSEY CROSS AND CHAROLAIS-JERSEY CROSS STEERS SLAUGHTERED AT 20 MONTHS—TRIAL IV

	Aberdeen Angus	*Hereford*	*Friesian*	*Friesian-Jersey Cross*	*Charolais-Jersey Cross*
Number of steers	10	10	10	10	7
Liveweight at start (April 3, 1967) (lb)	428	479	422	404	406
Liveweight at slaughter (April 19, 1968) (lb)	814	915	935	868	889
Liveweight gain over 381 days (lb)	386	436	513	464	483
Daily gain over 381 days (lb)	1.01	1.14	1.35	1.22	1.27
Carcass weight (lb)	412	468	453	425	448
Carcass grade	9 G.A.Q. 1 F.A.Q.	7 G.A.Q. 3 F.A.Q.	5 F.A.Q. 5 Boner	3 F.A.Q. 7 Boner	5 F.A.Q. 2 Boner
Dressing-out %	50.6	51.2	48.4	49.0	50.4
Kidney and channel fat (one side only) (lb)	4.5	5.2	5.4	8.1	7.4
Trimmed cuts %	62.4	61.1	60.7	58.8	62.7
Fat trimmings % (includes kidney and channel fat)	13.8	13.7	12.4	14.2	11.9
Bone %	23.8	25.2	26.9	27.1	25.4
Fat depth over ribeye at 12th rib (mm)	8.3	7.6	3.6	3.1	3.1
Ribeye area (sq. in.)	8.6	8.2	7.4	7.5	8.5
Fat colour	8 normal 2 slightly yellow	6 normal 4 slightly yellow	All slightly yellow to yellow	All slightly yellow to yellow	3 normal 4 slightly yellow

TABLE 2: MEAN CARCASS WEIGHTS (LB) OVER 381-DAY PERIOD

Date	*Friesian*	*Friesian × Jersey*	*Charolais × Jersey*	*Hereford*	*Aberdeen Angus*
Apr. 3, 1967	422	404	406	479	428
May 2	450	431	433	505	425
May 31	466	453	454	507	414
Jul. 7	507	479	469	509	425
Sep. 6	536	512	504	545	479
Oct. 3	589	569	575	594	533
Nov. 8	683	650	658	689	620
Dec. 14	770	731	740	768	703
Jan. 17, 1968	838	799	822	859	761
Feb. 14	903	839	863	885	811
Mar. 13	937	881	913	929	831
Apr. 18	935	868	889	915	814

produce the heaviest carcasses. This was because of their low dressing-out percentage relative to the Hereford.

The low dressing-out percentages for all groups could possibly be the result of feeding these cattle almost a sole diet of hay in the weeks before their slaughter. Their dressing-out percentages are as much as 3% lower than those of similar-aged cattle in the previous trials (see Barton, 1966).

The kidney and channel fat weights were heavier for the dairy-bred steers although the Friesians had only slightly more of this fat than the Herefords.

The trimmed cuts percentage was highest in the Charolais-Jersey cross carcasses and lowest in the Friesian-Jersey cross owing to their higher proportion of trimmed off fat (including kidney and channel fat) and a greater percentage of bone. The depth of fat over the ribeye was appreciably greater for the two beef breeds. The size of the ribeye also differed between breeds and the Friesian carcasses had the least cross-sectional area of this muscle at the 12th rib.

The dairy-bred steers in general had more carcasses with yellow coloured fat than the beef-bred animals. The fat colour of the carcasses in the Charolais-Jersey group were less yellow than the other two dairy-bred groups.

The carcass grading differed between breeds and each group of dairy-bred cattle had several carcasses graded Boner. The schedule price for Boner grade ox beef was lower by $1.00 a 100 lb carcass weight than the ruling price at the time of slaughter for both the G.A.Q. and F.A.Q. grades which are equal in price.

CONCLUSION

This trial has again confirmed the advantages of Friesian steers in terms of growth rate and leanness in comparison with Aberdeen Angus and Hereford steers.

The Friesian-Jersey cross steers also grew rapidly but their yield of trimmed, boneless cuts of beef was low in this trial. However, in another trial in which Friesians, Jerseys and Friesian-Jersey cross steers were compared it was found that the Friesian-Jersey cross performed almost as well as the straightbred Friesian for such important things as trimmed cuts percentage and rate of growth (Barton, *et al.*, 1968).

The Charolais-Jersey cross steers grew rapidly and they produced muscular and lean carcasses. However, this cross was difficult to rear on the bucket and their early growth rate was relatively poor. On balance, they have a slight advantage over the Friesian-Jersey cross in rate of growth and a bigger lead for trimmed cuts percentage. This advantage, however, is not sufficiently large to offset the various production difficulties associated with the Charolais, the chief ones being the fact that semen is expensive and has to be imported and that the heifers of the Charolais-dairy-breed cross are not suitable for milk production. This last disadvantage applies equally to any beef-bull cross with dairy cows and accordingly the use of the Friesian as a crossing bull over the Jersey cow is favoured by the dairyman. The male calves of this cross are suitable for the production of lean beef for fabricating into cuts or for manufacturing purposes.

The poor performance of the Aberdeen Angus steers presents a challenge to the pedigree breeders. The main defect of cattle of this breed is their slow growth rate and early maturity so that they are fat at unprofitable light carcass weights. The Hereford is slightly better in these two characteristics but it too needs to be bred for faster growth rate and more meatiness.

ACKNOWLEDGEMENTS

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REFERENCES

Barton, R. A., 1964: Developments in cattle and beef and veal production overseas. *Sheepfmg Annu.*, 93-121.

————, 1966: The performance of Aberdeen Angus, Hereford and Friesian steers, *Sheepfmg Annu.*, 61-74.

Barton, R. A.; Jones, C. F.; Donaldson, J. L.; Barnes, F. R.; Evans, D. A.; Clifford, H. J., 1968: A comparison between Friesian, Jersey, and Friesian-Jersey cross steers. *N.Z. Soc. Anim. Prod., 28:* 180-1.

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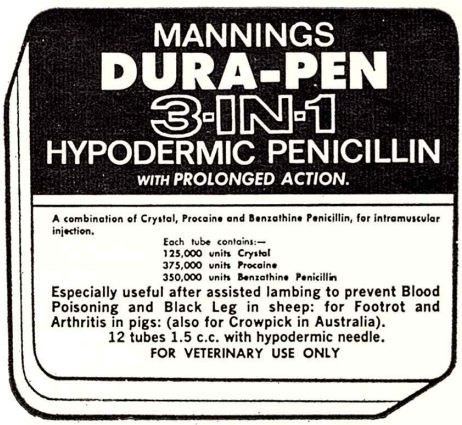
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NUTRITION AND MANAGEMENT OF THE BEEF BREEDING HERD

G. K. HIGHT*

THERE are three general principles for the efficient management of a beef breeding herd. These are: that a large amount of high-quality feed is grown, that a high proportion of this feed is consumed directly by animals, and that these animals are as efficient as possible in converting a unit amount of this feed into salable products. All these factors are inter-related and may vary in their importance on individual farms. It is, therefore, only possible to offer some general guides to the nutrition and management of the beef breeding herd. Since most of the beef breeding cows are situated on hill country, it appears most relevant to discuss their management in relation to this environment.

Increased topdressing, oversowing, subdivision, higher stocking rates and better management have contributed greatly to improving both the quality and productivity of hill country pastures. This development has extended the types of beef cattle that can be profitably farmed on hill country from old steers to single-suckled beef cows, to fattening all or a proportion of young cattle and even to multiple-suckled cows. There appears to be an increasing potential for farming animals which are more efficient at converting a unit amount of feed into salable beef on hill country. This points to the need to continually re-evaluate present concepts of the efficient feeding and management of beef cattle both as producing animals and in their complementary role as pasture improvers. As hill country increases in productivity, the necessity for cattle to control excess poor quality roughage, fern and scrub, is reduced, at least at higher stocking rates. Furthermore, there is a need to re-evaluate both traditional beef breeds, and dairy or beef × dairy cattle as beef producing "hill cows" in relation to the stage of farm development and changing market requirements. Some of these animals may outproduce the traditional beef breeds on hill country, but may also require different feeding levels, if they are to express their potential for higher production. The scope for intensifying and increasing the effici-

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ency of feeding hill country cattle is therefore being improved with the stage of development and stocking rate.

MANAGEMENT AND STOCKING RATE

It is now well recognized that with any given class of animal it is essential to increase the stocking rate to the stage at which individual output is so depressed that per-acre production, in terms of economic value, starts to decline. Within this concept of high stocking rates, the most suitable feed and systems of feeding need to be determined. When the stocking rate is increased from low to higher levels, output per animal may at first increase, remain relatively steady for a time, and then tend to decline rapidly with further increases in stocking rate. When stocking rates are increased from lower to higher levels, better utilization of the feed already grown can result in the animals being offered pasture at a more nutritious stage of growth, roughage is controlled and clover growth is stimulated. Initially, these factors can more than compensate for the additional stock carried. With increasing competition, animals tend to forage more actively, harvesting more of the feed grown, and to utilize the food actually consumed more efficiently. Eventually, a point is reached at which further increases in stocking rate results in a breakdown of the animal and feeding system, and output per acre begins to decline rapidly. The point at which output per acre is highest is often referred to as the "optimum stocking rate". Essentially, the objective should be to farm animals at or near the optimum stocking rate which gives maximum efficiency of feed conversion, and this will vary with any given class of animal during the year. Furthermore, the highest-producing or most sensitive animals within a group may be farmed at a lower stocking rate or higher feeding level during critical periods, since their response per unit of food intake will be greater than the lower-producing animals. The benefits obtained from the application of some management principles will, therefore, tend to be greatest when genetically efficient animals are farmed at a high-grazing intensity. With the beef breeding herd, not all animals need to be fed at a high level throughout the year. This enables mature beef breeding cows to perform a dual role, that of producing animals and as controllers of pasture roughage and weeds.

This principle of high stocking rates is vital to the further improvement of hill country, and will itself over-

come many of the pasture and weed problems on this class of land. It seems likely that beef breeding cows must ultimately fit into this concept of higher stocking rates or be replaced by animals capable of higher levels of efficiency as producing units. The wintering carrying capacity often limits the usefulness of traditional beef cows in developing reverted North Island hill country, compared with the rapid development possible with burning, oversowing, topdressing and concentrated sheep grazing. Unless large numbers of cattle can be concentrated on small areas for limited periods, and these areas heavily stocked in the spring, much of the advantage of cattle for developing land can be lost.

In discussing some aspects of the nutrition and management of hill country cattle, I would like to offer some brief comments on four topics. These are:

(1) The breeding of cows on hill country to ensure that they have the capacity to respond adequately to improved nutrition.

(2) A new bull mating harness for observing the oestrous behaviour of cattle.

(3) The effects of different levels of nutrition on the performance of breeding cows, with particular reference to pregnancy and lactation, and to the carry-over effects on subsequent calf growth.

(4) The importance of feeding animals according to their genetic capacity, as indicated from preliminary data with Friesians.

NUTRITION AND BREEDING

The response from the application of improved management techniques to beef breeding herds will be affected, in part, by their genetic capacity for high performance. It is, therefore, pertinent to discuss briefly some concepts in breeding cattle towards higher levels of performance. Ideally, beef cows must be highly fertile, have a high milk production, good mothering ability, a docile temperament, longevity, and the ability to rear calves capable of early sexual maturity but late physical maturity, and a rapid growth rate to slaughter. There must be an absence of defects such as bad feet, jaws or udders. The carcasses of the steer, bull or surplus heifer calves produced should have a high proportion of tender and flavourful lean red meat. Since most of the genetic pro-

gress towards high performance must come from the male side, these cows should be mated to fertile and performance-tested high weight-for-age bulls. The genetic capacity for a high liveweight gain is strongly inherited, so that bulls generally pass a large proportion of their superiority for this trait on to their offspring. High-gaining animals also convert a unit amount of food more efficiently into liveweight gains than do slower-gaining animals, and this factor, too, is strongly inherited. High efficiency of food conversion and high-gaining ability are strongly related genetically, so that selection for high growth rates will also improve feed efficiency. Improvement should be possible in all these traits of economic value by selecting higher-producing animals within breeds. The time is also appropriate, however, to re-assess the capacity of all cattle, both traditional beef breeds and cattle derived from the dairy industry as beef producing cows on hill country. Attention to relatively unimportant traits like non-functional conformation or shape, or coat colour, has aesthetic appeal, but is not closely related to a high growth rate. At a given age, the yield of red meat will be greater from higher-gaining cattle, irrespective of their conformation. Breeders of hill country cattle cannot ignore the lesson of the Friesian, a breed with poor conformation in the traditional sense, but with high gaining ability and milk production. Planned crossbreeding in commercial herds, using performance-tested bulls of two or more breeds, has been demonstrated to be a very useful practice. American studies generally indicate that crossbred cattle will have a greater vitality, fertility, milk production and sometimes higher growth rates than the average of the purebred parents. Constructive crossbreeding could enable increases in production for those traits which are weakly inherited, and in which it is difficult to make permanent genetic progress by other methods. It is unfortunate that adequate breed comparisons and the extent and advantages of crossbreeding on the productivity of hill country breeding herds has not been evaluated experimentally in New Zealand. The weaning weights of calves reflect to a substantial degree the mothering ability and milk production of beef cows. Cows that rear small calves at weaning tend to rear the smallest calves in subsequent years. For example, if the average difference in calf weaning weight between cows is 68 lb at their first calving, a difference of the order of 23 lb for each succeeding calf can be expected. As calf weaning weight is quite strongly inherited, and represents often

the end point in production on hill country, it can be used as an index of the capacity of cows for high performance. Culling of the poorest heifer calves, and where possible, their dams also at weaning, should therefore result in future cows with the ability to produce calves of higher weaning weights being selected as replacements. If the poorest heifer and steer calves are separated from the cows for a few hours and then returned to the mob after weaning, the mothers of these poor calves can be permanently identified for culling. Some farmers may consider it worth while to install weighing scales, and weigh the calves. Selected heifer calves could also be identified with numbered ear tags at weaning and records kept of their post-weaning liveweight gains and subsequent performance. Ear tags also serve as a permanent age mark. From a limited experience, numbered brass, aluminium or leader plastic ear tags seem to be the most successful, although a new nylon impregnated duo-tag is promising.

Unless beef cows have outstanding fertility and regularly produce calves of high weaning weights, they should be culled at about 8 to 9 years of age. From limited data in unselected herds, it appears that the overall calving percentage declines after 8 to 9 years of age, although the weaning weight of calves may not be greatly different from those calves from younger cows. Beef cows with defects of the feet, jaws, udder, with prolapse of the vagina, or with poor mothering ability, should be permanently identified and culled.

BULL MATING HARNESS

For efficient management under high stocking rates, the ideal requirement would be to identify the calving dates of all pregnant cows and to cull animals not-in-calf or separate them from the in-calf cows during late pregnancy. The benefits to be obtained from predicting calving dates, and identifying those cows not in-calf will depend on stocking rate, stage of farm development and the proportion of dry cows. At low stocking rates and early stages of development, the identification of a low proportion of dry cows may not be worth while, since no shortage of feed is likely to occur at critical periods and the few dry cows could be very useful for pasture control and land development. At high stocking rates, however, where a high efficiency is the aim and competition for the limited amount of good pasture over the

late-winter and early-spring periods is likely to be high, then the identification of dry cows and the prediction of individual calving dates could save costly supplementary feeding. Some experienced veterinarians appear to be able to predict calving dates within a few days, if pregnancy diagnosis is done when the cows are about 4½ to 5 months in calf, that is, if mating is restricted to the period from early November to late January, when pregnancy diagnosis is carried out in April.

A second method would be to use a device attached to a bull which would leave clear marks on the cows when they are mated. A number of these bull-mating devices have been tested at Whatawhata, including units from Australia and America incorporating an impregnated sponge, Kamar heat mount detectors, and an adaption of the sire-sine sheep crayons for use on bulls. All these devices proved unsatisfactory under extensive farming conditions. Lang *et al.* (1968) do, however, appear to have been successful in developing a new marking device for observing the oestrous activity of cattle under conditions where continuous observations are not practical. This equipment is illustrated in Fig. 1. It consists essentially of a ball-bearing which revolves inside a stainless steel container. Approximately one-third of the one-

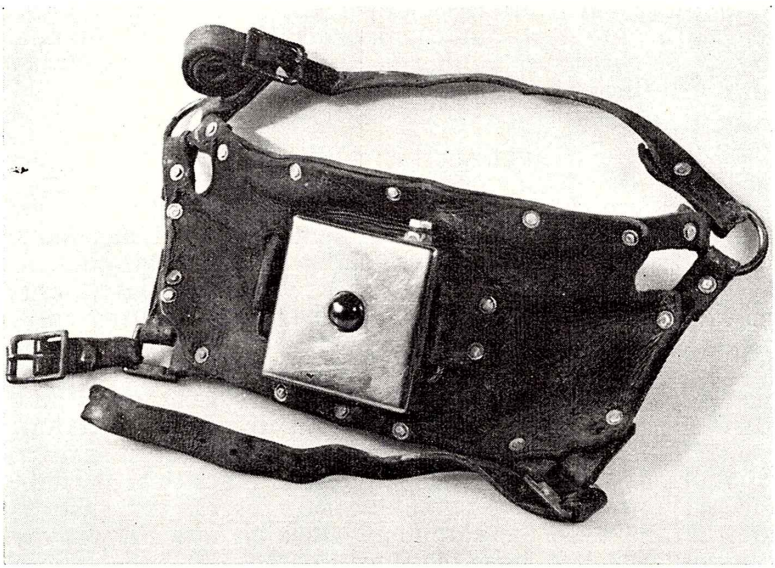

FIG. 1: *A marking device for detecting the oestrous activity of cattle.*

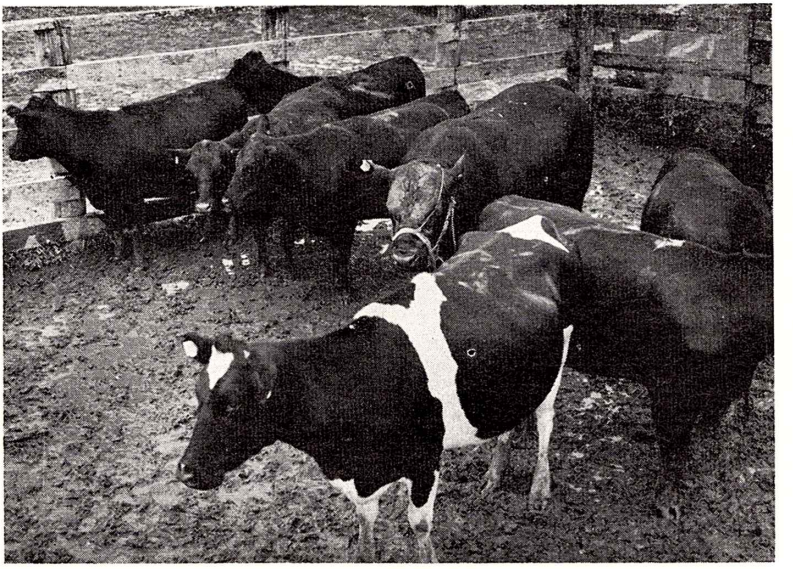

FIG. 2: *Streak marks of the marker on oestrous cows.*

inch ball-bearing protrudes from the container and this ball-bearing is held against knife edges by a spring. A threaded plug on the side of the container facilitates easy cleaning and filling. This device is attached to a leather halter and is held firmly under the bull's jaw. During mating, the bull invariably rubs his head along the back, sides or rump of the oestrous female. This contact is sufficient to rotate the exposed ball-bearing, leaving clear streak marks of the brightly coloured marker on the cow's hide, as illustrated in Fig. 2. The device is self-cleaning, and overcomes the problems of varied coat colours, mounting between females, mud and dung contamination and the high impact forces during mating. The most successful marking substance tested to date is neon ink (Coates Bros. Ltd., Auckland). This is a cheap, slow-drying, adhesive oil-based ink and can be obtained in a number of bright colours, enabling regular colour changes or its use on different coloured cattle. The marks are clearly visible on the hide for periods of 14 days or longer depending on weather conditions, and a 4 × 4 in. container holds sufficient marker for at least 14 days, depending on mating activity. These units should be available for the next mating season. Experience with this

equipment during the last season indicates that it can be used to check on bull activity, to identify mating dates and those cows not in-calf. Ease of identification of the oestrus cows would also make the artificial insemination of beef cows with semen from performance-tested bulls more feasible, and enable superior sires to have a wider impact.

The semen testing of all bulls at the commencement of the breeding season is a further test that can be used to assist in obtained high conception rates from beef cows. Bulls should be in good store condition at the time of joining and well adapted to the mating environment.

It may be unnecessary to emphasize that good stockmanship is among the most important factors in the management of the beef cow herd. Quiet but firmly handled cattle of good temperament, that have an ample water supply at all times, and which receive adequate control measures for lice and internal parasites will pay dividends. A high level of stockmanship is of vital importance, particularly when stocking density is high and during critical periods. Good managers are keen observers of animal behaviour, and are constantly attempting to balance the likely effects of their grazing management on the animals and on the pastures. A keen observer is able to identify those animals doing much poorer than the group average, and where necessary, preferentially feed them.

NUTRITION OF BEEF COWS

With the traditional beef breeding cow, the greatest single feed cost is the high proportion of the total feed consumed which is used simply to maintain liveweight. This is one reason why the overall efficiency of food conversion of traditional beef cows is low compared with rapidly growing young cattle or high-fertility sheep. If these feed costs can be decreased directly by maintaining or reducing cow liveweights when their feeding level is not critical, or by increasing the output of calf produced per unit of cow wintered, then the overall efficiency of feeding the beef herd will tend to increase. This is a basic reason why the improvement in per-animal productivity by selection for higher weaning weights, milking and mothering ability and high growth rates within breeds, or crossbreeding, and the farming of multiple-suckled cows is so important.

One of the objects of beef cattle research at the Whatawhata Hill Country Research Station has been to in-

vestigate the responses of beef breeding cows to different levels of feeding. Particular attention has been given to the effects of high or low levels of feeding in late pregnancy, and between calving and weaning. The number of cows wintered on hill country will usually determine the number carried throughout the year. The higher the number of stock wintered the more efficient is the utilization of spring feed likely to be. The efficient winter feeding of beef cows seems most likely to occur when the level of nutrition is restricted to a point at which there is a low cow and calf mortality, high calf growth rates, and unimpaired reproductive performance, particularly when the maximum number of stock are wintered with little or no supplementary feed. Where supplements of hay, silage or crops are fed to single-suckled cows at low stocking rates, this can merely result in these being substituted for pasture, and little, if any, overall benefit can be expected. It is only at high grazing intensities where a high proportion of the feed grown is being utilized, or on poor quality feeds, that supplementation is likely to be useful, and then only when a worthwhile economic response may be obtained. Adjustments of calving dates later in the spring, earlier weaning and the preferential grazing of some cows are examples of alternatives to feeding costly supplements. Casual observation also suggests that beef cows have a strong tendency to adapt their grazing behaviour to the amount of feed available, and graze more efficiently when the amount of feed offered is limited. Except at less than maximum grazing intensities and where a disease problem or special class of animal is being produced, it seems that spring calving is generally more efficient overall in the utilization of grass for beef than is autumn calving. With spring calving, the farmer is attempting to equate the peak food requirement of the cows during lactation with the peak availability of pasture. In most conditions, the mating period will therefore be planned to start one to two weeks before the onset of the spring flush of pasture growth. It may be better to slightly delay calving so that there is adequate pasture available, rather than feed large amounts of supplements to early calving cows.

A simplified outline of the design of the nutrition experiments conducted at Whatawhata recently is presented in Fig. 3. In a series of experiments, an attempt has been made to define the effects of extreme differences in levels of feeding on beef cows and their calves over the last 80 to 90 days or so before calving, and between calving

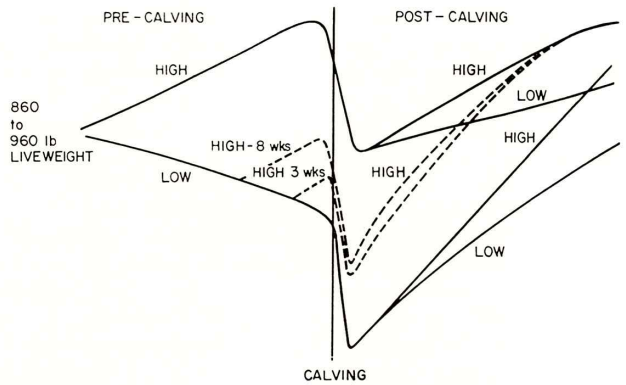

FIG 3: *Outline of the design of nutrition experiments.*

and weaning, and then to investigate possible techniques to minimize the effects of the critical periods identified.

The design of these experiments was briefly as follows: In late-May or June, pregnant Aberdeen Angus cows varying in age from three- to eight-year-olds were formed into different groups and fed on a high or low plane before calving. In two years, these animals were maintained on their respective treatments until each cow calved, and then each cow was fed on a high or low plane of nutrition between calving and weaning. In a third experiment, the cows were allocated to either a high pre-calving group or to low pre-calving groups with the cows in the later groups fed either a high plane for about eight or three weeks before calving, and thereafter a higher plane to weaning. Care was taken to balance the treatment groups for age of cow, calving date, initial cow liveweight, sire of calf and mating groups so that these factors did not bias the comparisons. The results have been evaluated on a per-animal basis in terms of cow liveweight, subsequent fertility and calf growth. All cattle were carried on hill country at a stocking rate of 4 to 6 ewe equivalents per acre.

High levels of feeding have been attained by offering beef cows ample autumn-saved pasture and hay to appetite over the pre-calving periods, and then spring pasture sometimes supplemented with hay. In contract, low levels of feeding have been obtained by confining beef herds to smaller areas of hill country that had previously been closely grazed with sheep or other cattle, and in which only poor quality roughage and fern was available. No supplementary feed has been given to the cows while

on a low plane of nutrition. The cows and their calves were weighed at fortnightly or monthly intervals, and the cow liveweight changes and their behaviour used to assess the feeding levels then imposed.

The main results of the experiments can be summarized as follows:

(1) A reduction in cow liveweight of 115 lb to 136 lb or 13 to 18% during the last 80 to 90 days before calving reduced the birth weight of calves by 12 to 13 lb or 20 to 22%, increased calf mortality, and reduced calf weaning weight by 36 lb compared with cows well fed before calving. These effects of underfeeding before calving are likely to represent the maximum difference obtainable compared with hill country cattle fed on a high plane before calving. Substantial liveweight reductions with mature cows in the early stages of underfeeding were not made unless food intake was severely restricted.

(2) The investigations of the effects of the relative and cumulative importance of the plane of nutrition before and/or after calving showed that the level of feeding before calving could have a similar effect on calf weaning weight as the level of feeding after calving. Both periods are important if the maximum weight of calf weaned is to be obtained. When the breeding herd was fed at a low level before calving and during the suckling period, the calf weaning weight at the end of January was reduced by 75 lb on average, compared with those animals fed on a high plane throughout. Severely reducing the plane of nutrition either before calving, or between calving and weaning decreased calf weaning weight by 36 to 38 lb.

(3) The fertility level of beef cows is sensitive to the level of feeding, particularly between calving and weaning. Some 44.8% of the cows maintained on very low levels of nutrition both before and after calving were empty the following autumn. In contrast, only 3 to 9% of those cows fed well before and after calving, those fed low levels before calving and then higher levels, or cows fed well before calving and then fed to maintain weight, were not in-calf the following year. This indicates that the fertility level can be depressed and subsequent calving dates delayed by very low levels of feeding after calving, and particularly if the cows are in low condition at calving. Overseas evidence suggests that this effect of nutrition on cow fertility is due to a delayed onset of first oestrus.

(4) Most of the heifer calves from these experiments have been retained at the Hill Station to evaluate the effects of the various levels of feeding before calving or during suckling on their post-weaning growth. The results indicate that very low levels of feeding, if continued until calving, may have a relatively permanent stunting effect on the liveweight of heifer calves, although this can be overcome by feeding their dams for about eight weeks or more before calving on a higher plane of nutrition to enable recovery of their autumn liveweights. Heifer calves fed with their dams on a low level of feeding between calving and weaning were able to compensate for any nutritional handicap by increased growth rates after weaning, compared with previously well-fed animals. However, large reductions in the weaning weight of heifer calves, if also accompanied by poor liveweight gains during their first autumn and winter could prevent their successful mating as two-year-olds. While this early mating should be the aim in the efficient management of all beef herds, the effect of the feeding level between calving and weaning at the end of January, on the liveweight of the heifer calves, may represent the equivalent of only 15 to 20 days high-plane post-weaning feeding.

(5) When beef cows were fed on a high plane of nutrition for eight weeks only before calving, the effects of feeding at a low level until calving were largely avoided. No differences were detected in calf mortality, weaning weights, cow liveweight at weaning or in subsequent fertility between groups of breeding cows fed on a high plane for only eight weeks before calving compared with cows fed to gain weight throughout late pregnancy. However, when cows previously on a low plane were fed to gain weight for three weeks only before calving and did not recover their autumn liveweight by calving, then calf birth weight was reduced by 8 lb.

(6) There are indications from the data that three-year-old cows are more susceptible to undernutrition near calving and during lactation than are older cows. Some preferential feeding of these younger animals, and older cows in light condition, may, therefore, be desirable when feed is in short supply, if increases in calf mortality and the proportion of cows not-in-calf the following years are to be avoided.

(7) A feature of the response of single-suckled Aberdeen Angus cows has been their high compensatory

growth or recuperative capacity between calving and weaning. Cows that were fed on a low plane of nutrition before calving have grown at up to ½ lb per day faster when on a high plane after calving than those previously fed at a high level before they calved, and they have been able to fully recover their liveweight by weaning. Furthermore, when the liveweight gain of cows has been restricted during suckling, they have regained any liveweight difference present at weaning by increased growth rates over the next winter and have actually produced heavier calves than those cows previously fed on a high level. This recuperative capacity of beef cows could be used to advantage to buffer a variable supply of pasture, provided they are not restricted during critical periods. Animals adapted to less than maximum feeding levels may perhaps be subsequently more resistant to undernutrition or maintain a competitive grazing advantage compared with animals previously fed to appetite.

(8) The average liveweight gain of the calves from birth to weaning has been within the range of 1.4 to 1.7 lb per day, when ideally this should be 2 to 3 lb per day. This suggests that the inherent milk production, calf growth capacity or the feeding level has been inadequate even when the lactating cow herself is gaining up to 3 lb per day. There appears to be considerable scope for improvement by selecting superior performing cattle from within the beef breeds, from crossbreeding, or direct feeding of the calves with higher-quality feeds.

Collectively, these results emphasize the importance of good feeding during critical periods. Mature Aberdeen Angus cows in good condition in the late autumn may be fed at a level to maintain weight, or allowed to gradually lose about 10% of their weight until eight weeks before calving. If they are then transferred to a higher plane of nutrition to enable full recovery of their autumn liveweight, and subsequently well fed through to weaning, there appears to be little effect on their performance. This approach could reduce the amount of supplementary feed and autumn-saved pasture provided for the beef herd over a high proportion of the winter period. The regular drafting off and preferential feeding of cows in poor condition can assist in avoiding "tail-end" animals. Hay feeding can be delayed as long as possible since, once feeding commences, beef cows tend to congregate at feeding points and may graze inaccessible areas less efficiently.

EARLY WEANING

There is little precise factual information on the importance of age and weight at weaning on the growth rate of calves from hill country beef herds. Earlier weaning could reduce the competition between beef cows and their calves for the available high-quality feed, enable beef cows to be used to clean up roughage more efficiently and earlier, and permit easier methods of direct feeding of calves with high-quality feeds, rather than indirectly through the dams' milk production. This indirect feeding of the calves becomes more inefficient as milk production declines after about 14 to 16 weeks of lactation. Again the advantages of early weaning will be partly determined by stocking rate and the availability of feed. Earlier trials at the Hill Station over the period 1953-8 on the effects of weaning beef calves either at the end of January, or in late April, showed that the weaning of calves weighing 250 to 310 lb in January could reduce their liveweight by up to 40 lb to the yearling stage when they were poorly grown during their first winter, but did not affect yearling liveweights when they were provided with reasonable post-weaning conditions compared with calves weaned in late April.

A further experiment was conducted at Whatawhata with 105 Aberdeen Angus calves from cows that had been previously on high or lower levels of feeding during late pregnancy during the 1967-8 season. In this trial the calves were weaned at either 14, 18 or 22 weeks of age on to spelled hill country pasture. Hay was always available, and the weaned calves were drenched at regular intervals. The calves that were weaned at 14, 18 or 22 weeks of age weighed approximately 207 lb, 263 lb and 329 lb at these ages, respectively. Calf gains from 14 to 26 weeks of age were 53 lb and 24 lb higher for those weaned at 22 or 18 weeks, respectively, compared with those weaned at 14 weeks of age. In other words, unweaned calves grew 1 lb per day faster to 26 weeks of age than those weaned at earlier ages. The calves weaned at 14 weeks gained 65 lb between weaning and 26 weeks of age. Although the weaned cows were used for roughage and fern control they lost less weight than those suckling calves. The milking cows may, therefore, have effectively served as a buffer for the calf during the adverse feed conditions during the later part of this trial. More detailed analysis and experience with early weaning is required before general guides can be given, but it offers several potential advantages.

POST-WEANING MANAGEMENT

The growing practice of using surplus dairy calves for beef production is providing pertinent lessons for the producer of beef from the orthodox breeds. In the absence of other factual information, studies on the rearing of these dairy-bred calves can be used as a guide to the post-weaning management of beef calves. These trials showed that calves require a good supply of leafy pasture in their first year of life, if high liveweight gains are to be achieved. Calves are highly selective in their choice of feed, particularly after weaning and this fact, together with the necessity to reduce re-infestation with internal parasites, indicates that young beef calves should be rotationally grazed on leafy pasture with a good white clover content, ahead of the mature cattle and breeding ewes, and shifted at regular intervals. Weaners should be inspected frequently to check on the feed, to ensure that there is a good supply of clean water, and that all animals are thriving. Drenching for internal parasites at weaning and over the first autumn with the newer drenches, Bovizol and Nilverm, often seem to be justified, as also will spraying for lice if these are present. Many farmers also provide fresh high-quality hay daily from weaning until the following spring.

The amount and type of supplementary feeding required by young cattle on hill country has not been clearly defined. At Whatawhata the heifer calves often have poor liveweight gains between April and September, and then rapid growth occurs until the following May or June. To what extent it is possible to use the effects of this rapid compensatory growth and reduce the amount of supplementary feed provided during their first autumn and winter with cattle of various liveweights is not known with precision. Very-well-grown heifers may need to be only moderately well fed to gain between ½ to 1½ lb per day during the winter, whereas small heifers may require to be fed well from weaning to their first mating, if they are to produce good calves as two-year-olds. This earlier mating to young bulls can reduce the overhead costs of feeding herd replacements, increase the scope for selection and permits an earlier assessment of the breeding potential of the animals in terms of the weight of calf weaned, compared with calving at the three-year-old stage. Heifers weighing 650 lb or more at mating should be preferentially fed throughout pregnancy, and particularly while suckling their calves and possibly weaned early, if

a low calving percentage the following year is to be avoided.

FRIESIANS AS BEEF "HILL COWS"

As indicated previously in this paper, the optimum level of feeding for the beef herd will depend, in part, on the weight of calf weaned per unit of cow liveweight, and the response obtained from the provision of higher feeding levels. It is well known that the weight of calves at weaning is influenced markedly by the milk production of the dam, and to some extent by the quality of the pasture offered. The Friesian breed has an inherent capacity for a high milk production and growth rate, is physically late maturing, has a docile temperament, the capacity to suckle two or more calves and also, the carcasses of the steer, bull or excess heifers produced are acceptable to modern market requirements. For these reasons, purebred Friesians have been compared with single-suckled Aberdeen Angus cattle as beef producing cows on hill country at Whatawhata. The comparison has been made for two seasons.

In the first year, 22 purebred rising two-year-old Friesians were purchased in the autumn from several herds. Thereafter, they were grazed with 26 purebred rising three-year-old Aberdeen Angus and their production compared when suckling one calf. The Friesians produced calves weighing 62 lb at birth compared with the 56 lb calves born to the Aberdeen Angus. At weaning on January 31, 1967, the Friesian calves were 113 lb heavier (423 lb v 310 lb) or when allowance was made for age differences, were 66 lb heavier than the Aberdeen Angus calves. The Friesian heifer calves have maintained an 80 to 100 lb advantage throughout on hill country, while the steer calves attained a 200 lb advantage compared with the Aberdeen Angus when transferred to better land at Ruakura. The younger and higher-producing Friesians gained less liveweight while suckling their calves, but gained more after weaning and during the winter than did the Aberdeen Angus, even when grazed on poor land without supplementary feed.

In the second year, 19 two- and 30 three-year-old Friesians were single- or double-suckled and grazed with 43 three- and four-year-old single-suckled Aberdeen Angus on hill country. The single-suckled Friesians gained more (0.59 lb per day) before calving and while lactating, than did the three-year-old Aberdeen Angus cows, and the Fries-

ian calves were 17 lb heavier at birth and grew 0.45 lb per day faster before weaning than the Aberdeen Angus. The younger Friesian calves that were double-suckled were similar in weaning weight but slightly slower gaining to weaning than those single-suckled. The double-suckled two-year-old Friesians produced 726 lb, and the three-year-olds 656 lb of calf at weaning on February 6, 1968, compared with 373 or 337 lb of calf for those single-suckled or 326 and 301 lb for the three- and four-year-old Aberdeen Angus. The advantage of the Friesians could be further increased by suckling more calves on a higher feeding level. This illustrates the principle that feeding levels may need to be altered at different times of the year with animals of a higher productive performance if they are to realize their potential, and avoid possible fertility problems. There seems no reason why Friesian or Friesian crossbred beef cows, once adapted, should not perform a dual role for the control of hill country pastures and weeds, and also be more efficient for beef production on hill country. Further evaluation studies are now in progress. Indeed, some integration of the dairy and beef industries may be possible in the future.

SUMMARY

The importance of high stocking rate, of wintering the maximum number of stock, of a high weight of calf weaned from breeding cows, and of using the minimum amount of supplementary feeds offered to animals efficient in converting pasture to beef were emphasized. Nutrition experiments have indicated that extremes in levels of feeding before or after calving could reduce calf weaning weights by about 36 lb. Critical feeding periods appear to be about 8 weeks before calving, and between calving and weaning if reductions in calf birth and weaning weight, and increases in calf mortality and the proportion of empty cows is to be avoided. A bull mating device has been developed for recording the oestrous behaviour of cattle, the early detection of empty cows, and of calving dates. Preliminary results indicate that purebred Friesians may have the genetic potential to attain a higher productive output on hill country than the traditional Aberdeen Angus, but that modification of the optimum feeding level required while suckling their calves may be necessary.

ACKNOWLEDGEMENTS

I would like to record my gratitude to K. E. Jury for the statistical analyses of the beef experiments, for helpful discussion with colleagues and to several members of the Whatawhata Hill Country Research Station staff, particularly to J. B. Clayton and A. E. Uljee for valuable technical assistance. The figures in the text are the work of the Ruakura Art Section.

REFERENCES

Hight, G. K. 1966: *Proc. Ruakura Fmrs' Conf.*, pp 19-31.
———— 1968: *N.Z. J. agric. Res.* (in press).
———— 1966: *N.Z. J. agric. Res., 9:* 479-90.
———— 1968: *Proc. N.Z. Soc. Anim. Prod., 68:* 131-44.
Lang, D. R.; Hight, G. K.; Uljee, A. E.; Young, J., 1968: *N.Z. J. agric. Res.* (in press).

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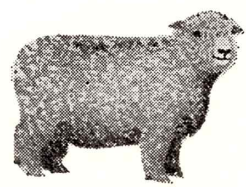

RECKITT & COLMAN (NEW ZEALAND) LIMITED AUCKLAND

RECENT LIVESTOCK PRODUCTION TRENDS IN UNITED KINGDOM AND U.S.A.

SIR JOHN BORTHWICK BT*

BEEF PRODUCTION

THE CHIEF PROBLEM facing the United Kingdom livestock producer is to maximize profits.

Almost 80% of British home-grown beef comes from the dairy herd—and this means Friesian bull calves, for the most part. Since Charolais imports into Britain, a great many Jersey, Guernsey and Ayrshire calves sired by Charolais have been hand-reared and fattened for veal or beef.

Hand rearing is an established practice in Britain and some details may be of interest.

On my own farm, a sample group of 94 calves, bought at one week of age, between September 1967 and January 1968, was studied in terms of average liveweight gain and rearing costs over a twelve-week period.

TABLE 1: HAND REARING OF CALVES: UNITED KINGDOM

Average liveweight gain and rearing costs over a 12-week period

	Average weight (lb)
Weight on arrival	90
Weight on weaning at 5 wk	150
Weight when sold at 12 wk	218
Daily liveweight gain to 5 wk	1.2
Daily liveweight gain to 12 wk	1.6

Costs	£ s. d.	
40 lb milk powder	2 7 6	£5 11s. 4d. = 10½d./lb liveweight gain.
250 lb rearing mixture	3 3 10	
Hay, straw, veterinary services etc.	10 6	
Labour, mortality and share of farm overheads	3 15 0	
Total cost, 1 to 12 wk	9 16 10	

The results are shown in Table 1.

A similar analysis of a group of 1,100 calves carried out in Yorkshire by the Beef Recording Association (U.K.) Ltd., showed the average cost of milk and food as £6 18s., representing 14d. per pound liveweight gain.

*Thos. Borthwick and Sons, London.

About 48% of dairyfarmers in Britain rear and graze their own beasts; 52% sell the calves at 1 week or 12 weeks of age. These may be spring- or autumn-born calves. The United Kingdom subsidy system favours the autumn-born calf which will be fat before reaching 18 months of age and will be sold in the period of traditionally high prices from January to May. The finished beast will gross about £80 excluding the £11 calf subsidy.

It will be suckled on pasture until the winter, and then fed hay and ½ lb concentrate until it is weaned. Silage may then replace hay, and up to 25 to 30 lb per day may be consumed by the time the weaner goes out to grass at 7 to 8 months. A growth rate of 1½ lb per day must be maintained from 6 months of age (at, say, 500 lb) to slaughter the following spring (at, say, 950 lb), *i.e.*, a total of 450 lb must be added over a period of about 300 days. Barley, 2 to 3 lb, plus concentrate is fed for the first 4 to 6 weeks on grass and again in autumn (up to perhaps 6 lb) when the beasts are yarded for the winter. Silage *ad libitum* plus 6 to 8 lb of supplement should finish the beast to the required weight.

Grass is costed at £10 per beast, with just under two beasts per acre. This includes seed, establishment and fertilizer, and represents £10 worth of summer grazing plus conserved grass.

It is estimated that, before reaching the paddock, the beast has inside him £17 worth of food including milk substitute, 3 cwt of hay, 4 cwt of rearing mixture and 4½ cwt of barley and concentrate. Average total costs are as follows:

	£	s.
Food to weaning	17	0
Grass	10	0
Barley while grazing (costed at £20/short ton)	2	0
3½ cwt fattening winter feed (costed at £22/short ton)	4	5
Veterinary services, mortality and overheads	8	0
	41	5
Value of week-old calf	13	0
	54	5
Value of finished beast	80	0

—leaving a gross margin, excluding calf subsidy, of £25 15s. (almost £50 per acre).

Fatteners of single-suckled beef breed calves bought at 5 to 8 months of age are also aiming at 1½ lb daily liveweight gain by the use of supplementary rations both during the grazing period and to augment the protein content of conserved grass during winter housing.

Intensive fattening with cereals is still practised but respiratory troubles and disease have caused high mortality (up to 10% is common). Barley has risen in price from £16 to £23 per ton average, and the price of calves from £8 to £14. Admittedly, sale prices have also risen from a high of 3s. in 1962 to round 3s. 6d. per lb carcass weight in 1968. This price includes about 7d. per lb fat stock subsidy. The farmer has already received a subsidy of £11 5s. per steer when the beast reaches 8 months of age. So his total gross realization for a 600 lb carcass could be £116 at the top of the market. In the autumn months, the market price can fall by as much as 6d. per lb carcass weight and his realization per head to £100.

Carcasses of 600 lb are rare from intensive beef production but intact animals (bulls) fattened under special licence are not always finished until about this carcass weight. They kill out at round 54 to 55%, whereas the intensively-fed steer will achieve 56 to 60% and the carcass range from 480 to 550 lb. Top prices are paid for this tender, young beef except in the peak autumn months when grass-fed cattle can sell for as little as 2s. 8d. to 2s. 10d. per lb carcass weight including fat stock subsidy.

TABLE 2: AVERAGE COSTINGS FOR INTENSIVE BEEF PRODUCTION: UNITED KINGDOM

Costs	£ s. d.
Calf at 1 wk	14 0 0
Cost to 12 wk	9 16 10
Food from 12 to 47 wk	40 0 0
Veterinary services	4 0 0
Culls and mortality	2 0 0
Labour and overheads	8 0 0
	77 16 10
Returns	
	at 3s. 6d. *at 3s.*
Sale of 500 lb carcass	87 10 0 75 0 0
Calf subsidy	11 5 0 11 5 0
	95 15 0 86 5 0
Net profit	20 18 2 8 8 2

Average costings for intensive beef production are set out in Table 2.

The £20 net profit is attainable four months in the year; in the remaining eight months, net returns will vary between £8 and £20 provided the stock are free from virus pneumonia, salmonella, etc., and provided both management and stockmanship are of the highest order.

Young bulls sell at a discount of about 2d. per lb carcass weight but convert food at round 4.5:1, compared with steers which average 5.5:1 from one week of age to slaughter.

Beef and dairy breed growth rate averages are as follows:

	Daily L.W. gain from 12 wk to slaughter (lb)
Charolais × Friesian	2.66
Hereford × Friesian	2.5
Friesian	2.47
Charolais × Guernsey × Jersey × Ayrshire	2.35
Angus × Friesian	2.15

This has encouraged Jersey, Guernsey and Ayrshire breeders to use Charolais semen for about one-third of their dairy cows. The resulting calves sell at one week for intensive fattening or milk-fed veal at £10 to £11 compared with £14 for a Friesian, £18 for a Hereford × Friesian, £20 for a Charolais × Friesian and £5 to £6 for a Jersey or Guernsey bull calf.

Intensive beef production on a cereal/concentrate diet is gradually diminishing in the United Kingdom in favour of the 15- or 18-month-old fat beast.

Trends in British Breeding

British beef breeds continue to flourish but profits are meagre. Many believe that the slow growth rate of the single-suckled calf must be improved. The majority of the breeding herds are in Scotland and in the hills of north-west England and Wales. The problem is to obtain growth rate without losing hardiness and foraging instinct.

Crossbred females such as the Blue Grey (White Shorthorn × Galloway) have long been recognized as possessing some of these qualities but they do not have sufficient milk. Two trends have developed recently: the develop-

ment of the Charolais × Blue Grey cow, and, more controversial, the Charolais × Friesian cow as a beef dam. Both are proving successful in their way but hybridization has now progressed a stage further—Charolais × Angus bulls are being mated to the Blue Grey cow in what the Americans call the four-way cross. Weaning weights at 180 days have been recorded in America and show the following average pattern:

Progeny of	*Heavier than purebred calf (lb)*
Purebred bull on crossbred cow	16
Purebred bull on 2nd cross cow	24
Crossbred bull on 2nd cross cow	30
Purebred bull on 3rd cross cow	32
Purebred bull on 4th etc. cross cow	30

It was M. Tatham, of Waitara, repeating the thoughts of Dr C. P. McMeekan, who first caused me to realize the importance of growth rate under United Kingdom conditions. Although most breeding takes place on land worth about £50 per acre, the majority of animals (whether United Kingdom-produced stores or imported from Eire) are fattened on land which sells at £250 to £300 per acre. Thus, to obtain 6% on the capital invested in land, in comparison with capital invested in stocks and shares, a return of not less than £15 per acre is required. This is obtainable in many parts of the United Kingdom from dairy and cereal production, but for beef fattening to achieve parity, high stocking rates and high growth rates are necessary.

The Charolais as an Improver in the U.S.A.

American research has been based on the following targets: Birth weight and weaning weight; liveweight gain from birth to slaughter; high dressing-out percentage; maximum loin area per 100 lb carcass weight; maximum loin length; minimum internal fat; and tenderness.

Weaning weight trials in the United States have already been mentioned. On a ranch I visited in Kansas, where the Charolais was used with Angus cows, the first crop of calves averaged 72 lb heavier, at 539 lb, than the previous year's straight Angus crop.

In Wyoming, Herefords predominate and the Charolais is beginning to be used on the cows. I was quoted 360 lb weaning weight for Hereford calves and 420 lb for the Charolais × Hereford. At 18 months, the Hereford steers

averaged 680 lb while the crossbreds averaged 840 lb. Yields are remarkable as regards loin eye area in Charolais cross steers; dressing-out percentage is high, and carcass fat content is low.

Now that the days of chilled beef are over, New Zealand's exports will be cartoned, and prime beef prefabricated. This will force meat exporters to buy on a yield basis and to ship different cuts to the most profitable markets. Lean beef will be at a premium, provided cutability and finish is not lost.

Importers into the United States face considerable competition from the home market, as indicated by examples drawn from United States' sources (see Table 3).

TABLE 3: EXAMPLES OF BEEF PRODUCTION RESULTS IN U.S.A.

	Charolais × *Angus*	*Angus*	*Hereford*
Dressing-out %	(175) 63.17	(177) 62.53	(45) 61.63
Ribeye area per 100 lb carcass weight (sq. in.)	1.92	1.89	1.63
Fat depth over ribeye per 100 lb carcass weight (in.)	0.054	0.096	0.099
Ribeye area (sq. in.)	12	9.4	10
Daily liveweight gain in feedlot (lb)	3.04	2.58	2.64

Records drawn from four states report food conversion ratios in feedlots of:

8.53:1 (Charolais × Angus)
9.93:1 (Hereford × Angus)

1st cross Charolais - Hereford carcass	690 lb (average of 32)	= 17 months old
¾ Charolais - ¼ Hereford carcass	716 lb (average of 27)	= 17 months old
Difference	26 lb at 3s. per lb = £3 18s. per beast.	

LAMB AND MUTTON PRODUCTION

Farming philosophy in the United Kingdom has, until recently, been based on the hopeful assumption that the consumer will eat what is produced, irrespective of specific market demand.

It has been pointed out from time to time that the fresh meat wholesaler faces a dilemma in that he is caught between this attitude and the increasing insistence from supermarket groups that only from New Zealand can a standard specification line of lambs be obtained. Importers and fresh meat traders alike face this problem in respect of beef in carcass form, a form likely to be entirely replaced by carton packs.

So thoughts turn to the live animal. Much work has been done in the United Kingdom, United States and in New Zealand to establish the relationship between genetics and ultimate carcass value.

Dr John Bowman, of Reading University, starts with the premise that the progress made in lower production costs of pork and poultry militate against increased consumption of mutton and lamb whose costs are static or rising, because improvement in the genetic potential of sheep has not been achieved owing to lack of application of known selection techniques.

This is being remedied by J. B. Cadzow, in Scotland, and by Thornber-Colburn Sheep Ltd., Halifax, U.K., and for reasons of sheer economic necessity is likely to have a gradual impact in the United Kingdom where land values and other costs have risen astronomically since the war.

What has been learned so far? First, that the reproductive performance of the ewe is related to bodyweight at mating. For example, the results of tests carried out with Scotch Blackface ewes, using Colbred, Border Leicester and Teesdale rams, are shown in Table 4.

TABLE 4: RELATIONSHIP OF EWE BODYWEIGHT TO REPRODUCTIVE PERFORMANCE

Results of tests with Scotch Blackface ewes

Bodyweight (lb)	*No. Tested*	*% Ewes Lambed*	*Lambs per Ewe*
70—74	281	61	1.16
80—84	274	79	1.24
100—104	86	84	1.35
105+	35	96	1.42

In the U.S.A., a trial on 11,000 ewes, mostly Corriedales, found that ewe and lamb mortality and barrenness were not factors with the ewe of more than 100 lb liveweight, but in ewes below this weight all three traits were in evidence.

Secondly, heterosis is the antecedent of carcass conformation. J. S. Broadbent, using Suffolk rams on three maternal breeds has demonstrated that faster growing progeny groups have carcasses with larger eye muscle area and higher retail values.

The work done in New Zealand by R. A. Barton, Massey University, which emphasized the need to produce lean carcasses, was, in some measure, a stimulus to the production of the Colbred. This hybrid contains Clun, Dorset Horn, Border Leicester and East Friesland blood and the rams are proving useful crossing sires for half-bred ewes. Higher prolificacy and lactation do not, to my mind, compensate for a rather leggy type of lamb whose carcass lacks finish under 50 lb carcass weight. There is, of course, a market for these heavy lambs in the Midlands and North of England and they certainly have the merit of not clashing with the New Zealand "D" (20 to 28 lb carcass weight range) or "2" (29 to 36 lb carcass weight range).

There are many arguments in favour of crossbred rams and ewes. In America two-breed crosses had an average gain over purebreds of 5.2 lb in weaning weight; three-breed crosses 9.5 lb; and four-breed crosses 10.4 lb.

Brian Cadzow has written:

"In the basic breeds of this country, [U.K.] growth rate, conversion factor and carcase conformation are all correlated. To acquire growth rate one must have size, and early maturity.

"The drastic fall in crossbred wool prices has underlined the importance of increasing the ratio of fat lamb to wool. One must cut out wethers for the crossbred clip and our 'Improver' rams have now been proved to produce a better wether fat lamb when mated with the Romney or the Scotch Blackface than the Cheviot or Blackface ram can achieve.

"The crossing ram must be prolific and the 'Improver' (which is a Dorset Horn/Finnish Landrace combination) can now be guaranteed to pass to its ewe lamb progeny —almost irrespective of the dam chosen—an almost constant 200% lambing potential.

"The series 8 ram is succeeded by the series 12 'Improver' which has a complex build up and is not a straight cross but a hybrid. The horns are gradually being bred out and the carcase hindquarters improved.

"Mortality is a high factor in Scotland *(e.g.,* Blackface can drop 150%+ but less than 100% often survive) and hybrid vigour at birth is a grand form of insurance.

"What rams do we recommend for this twin-bearing hybrid ewe: the New Zealand Southdown (large) or Ile de France. In time we shall produce a custom built hybrid ram for this purpose. Our aim is 80/85% of dead carcase weight out of each ewe mated.

"McCall-Smith takes a different approach by selective culling and cross-breeding within the breed of Scotch Blackface sheep. He started by progeny testing and recording the performance of all his 1,200 ewes! He tagged known good performers to form the nucleus of his New Flock. He restricted outside purchases to known families whose previous ewe lambs conformed to his requirement of twin production plus the milk to rear them. 1966 was a cold wet spring and yet the new flock reared 150% compared with the old flock 95%.

"The third trait he looks for is the ability to turn off at least one fat milk lamb per ewe on his farm of 1,200-2,000 acres.

"He is now achieving a 100 lb live lamb in 100 days and the progeny of 600 ewes (the New Flock) are averaging 34 lb on the hook for twins and almost 300 of these ewes gave 200 lb of live lamb in 93 days average weaning time. At a high altitude this seems a splendid achievement when one realises that he can only run one ewe to two acres."

All this experimentation is negated by the Livestock Subsidy system. No uniform grading system exists except for acceptance or rejection. Thus, the fresh meat trader's problem to secure uniformity is almost insoluble.

I believe that in the United Kingdom forward contract buying of lambs on a tight specification as to weight and grade will eventually be adopted. I also believe that the United Kingdom consumers' market will continue to absorb 20 million plus New Zealand lambs each year.

The continental housewife is likely to prefer fresh English to frozen imported lamb.

Furthermore, there is a wide body of opinion which casts doubt on future fat-lamb production in the United Kingdom. The hills are isolated; the life is hard and men less willing than their fathers to work for a wage near the bread line. Tenant farmers on Scottish hill farms are averaging £685 net income per farm employing 1 to 2 men. This compares with a minimum agricultural wage of almost £625 for an unskilled paid worker.

Lowland sheep production is determined by the price of land. At £300 per acre, cereals or milk are viable and

intensive lamb fattening at 10 to the acre can be justified where grass is a convenient break crop.

A Lincolnshire farmer told me in April that he keeps 1,800 ewes on 400 acres and reckons to rear 150% of lambs. His gross output is therefore £54 per acre, his direct costs £22, overheads £22, leaving a net profit of £10. He admitted that he could sell his land at £300 per acre and I was tempted to ask him why he did not.

All-concentrate diets for intensive lamb production on high cost land have been tried, but mainly on research stations. Early weaned at 8 weeks, the wethers were fed a cereal plus protein supplement and converted at 3:1. More success was obtained by adding hay.

Commercial fatteners are more likely to step up creep-feeding of lambs and manage their grass to permit 10 to 12 ewes to the acre. Rotational grazing on subdivided paddocks, followed by fertilization, is becoming an accepted practice on lowland farms.

The production of livestock is complicated enough, but, in the United Kingdom, marketing is a speculative lottery. The subsidy system distorts the market without enabling the meat traders to pay a premium for quality.

Pressure has been brought on Government to revise the whole system of exchequer support both in the light of Britain's eventual entry into the Common Market and to keep pace with marketing patterns.

"Uniformity" is the cry of the supermarkets, and, to encourage the production of even lines of lamb, some trades are offering forward contracts complete with rewards and penalties. New Zealand grading is held up as the model and much of the live production research which has been mentioned is designed to assist in carcass improvement. At one time, it was suggested that hybrid lambs be leased to groups of farmers who would fatten under contract. The response was poor, and the idea was dropped. Progeny testing received a boost from it, however, and it is hoped that a Sheep Recording Association will follow the already successful Beef Recording Association. Twelve British breed societies, comprising almost 600 members, are now recording animal liveweights. The ideal, in my view, is, first, for all pedigree males to be sold on known performance record, and, secondly, that commercial producers who want to collate data may become members and receive weighing and recording facilities regularly.

Britain now has a Meat and Livestock Commission, which costs the farmer 10s. per beast and 2s. 6d. per

lamb killed, and which is supposed to co-ordinate all forms of research.

The Commission's task, however, will be hampered by chauvinistic breed societies, prejudice among farmers and suspicion from meat traders.

NEW ZEALAND PRODUCTION

New Zealand has changed its philosophy somewhat since 1961. Beef production is receiving as much thought and publicity as the prime lamb industry. The cattle population has risen to 7 to 8 million, dairy-beef weaned sales are now an accepted practice, and the bobby-calf kill is falling.

In December, 1967, 273 lb weaners sold at an average price of $NZ31—£15 10s. in United Kingdom currency. If the £11 5s. calf subsidy receivable in Britain when the calf is 8 months old is added to this, the figure is £26 15s., which is round the current United Kingdom average. Similarly, the price of 630 calves averaging 200 lb sold for $NZ24 to $26 which again is in line with United Kingdom prices.

This paper began with a discussion of beef, and finishes with beef, for the obvious reason that it is in universal demand—but everyone must heed the warning that yield of trimmed cuts of beef is becoming the yard-stick, and specification buying more and more generally practised.

Dependability of supply, higher and more uniform quality—at reasonable retail prices—are the slogans of Dr G. A. Carpenter of the University of California. His remarks are valid and should be heeded by producer and meat traders alike if overseas earnings from New Zealand are to be increased, as I am convinced they will be. I am not as confident as Professor B. P. Philpott that Europe will be an expanding market for New Zealand's products. I fear that it is to the United States that one must look for the great volume of demand, in the same way as it is my belief that tourism promotion should be directed toward the dollar.

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MARTON.

TRENDS DEVELOPING IN A ROMNEY FLOCK BRED FOR HIGHER FERTILITY

H. D. WARREN*

THE intention in this paper is to discuss the problems and changes which have taken place in the "Turanganui" stud Romney flock over the past 20 years.

Numbering 500 ewes in 1948, with a gradual climb to 1,500 today, it has principally been run together with flock ewes on the main property of 800 acres, but during the past few years it has spent an ever-increasing time on the steep greywacke hill country block of 330 acres situated seven miles away.

LAMBING PERCENTAGE

The average lambing percentage was round 98, initially, with the ewes spread out during lambing, and shepherded much as any commercial flock would have been at that time. The sheep were open faced, long nosed, up off the ground, with mainly medium to fine wool, and hard to sell. There was a proportion with short bodies and very low tails which helped produce dry-dry ewes to the extent of 10%.

The task was to raise the lambing percentage and breed a type of ram more acceptable to the demand of the time. It was decided to introduce rams with better heads, better bone, a long body with high tail setting, and stronger wool. At the same time, it was decided to shepherd more intensively at lambing, and cull all the dry-dry ewes, two-tooths included, and to use twin rams as much as possible.

The more intensive shepherding improved the lambing by about 10%. Conformation changed rapidly during this time and the heads and bone had become stronger and shorter as a consequence of the high heritability of these characteristics. The shorter-bodied ewes had largely disappeared, the tail-setting had improved and the rams were finding a market more readily.

After a few years, it was realized that using sires that were born as twins was in itself insufficient to provide the boost needed to lift the lambing percentage significantly, so plans were laid for the collection of ewe records

* "Turanganui," Pirinoa.

which would give the corrected weight of lamb weaned. This, however, proved to be too heavy a demand on available labour, so it was modified to the number of lambs weaned per ewe and any other information which was considered to be of value.

Sires kept for use in the stud were then selected from dams of 150% live lamb production which was taken on the dam only. It proved difficult to find enough sires of this calibre with satisfactory conformation and wool. This was in 1958 when wool and stock prices were in general at a satisfactory level. There was only limited interest in fertility on the part of ram buyers, and, when introducing it as another factor, the breeding of a type of sheep acceptable to the market became more difficult. It is not because the high fertility sheep are much different but more because of the limiting of numbers from which to select. A breeder, like any farmer, has to sell his product, and economics demand that he take some heed of what the customer wants.

Easy identification of the good and poor producer was now straightforward. With the aid of the records, a culling policy was formed, which entailed the retaining of all five-year and older ewes with a lifetime live lamb production of 150% or more, and the culling of all four-year and younger ewes with less than 100%, excluding the two-tooths which had lost their own lamb but reared another, and they, to stay the following year, had to produce twins. This, together with the culling of all dry-drys, was chipping away at the low producer and encouraging the best by increasing their proportion in the flock. It meant that many fine looking ewes were being thrown out of the flock; this required some readjustment in one's outlook.

The ewe records were so arranged that they were in their sire groups, and this made a check on the sire influence very easy indeed, and, together with the wool analysis that we now have, is a very good guide to the best family strains to follow.

But it must be remembered that there is a time lag of two years between a sire's first crop of lambs being dropped, and their lambing as two-tooths. The two-tooth lambing is a fairly reliable yardstick of fertility and this, on a sire basis, has varied from as little as 65% live lambs to as much as 140%. Some ewe families which we had previously thought highly of, began to show up in a poor light and *vice versa*.

Now the bulk of those ewes which had proved themselves to be superior producers are of a very similar

type. They have good length, with a slightly lighter fore end, and a deep roomy stomach not unlike a dairy cow. The poorer performers are of the more blocky type, broader and deeper in front, and have a tendency to put the condition on their own back rather than on the lamb.

Although the use of high-fertility sires is slow to lift lambing percentage, owing to the low heritability of the characteristic, the capacity to milk has improved remarkably and even had there been no other benefit, the improvement in this alone would have made the concentration on fertility justifiable. Ten years ago, quite a few two-tooth ewes were unable to feed twins properly; today, the removing of a twin lamb through lack of milk is rare. With the improved milk flow, the lamb crop has become a more even line without the tail end which used to exist. Tallowy ewes with lumps of fat over tail and ribs have also disappeared.

WOOL

In 1962, I. Thomas, of the Department of Agriculture's Sheep and Wool section, gave the two-tooth ewes of that year a detailed wool record, and this has been continued ever since. At the second shearing in February, the wool is weighed and given a rating for quality, style and tip. Recently this has also been done at the hogget shearing in September to provide information prior to sire selection and again at the second shearing for the final record of those ewes being retained in the flock. The later assessment has been more accurate owing to variations taking place during the development of the ewe. The procedure has been to cull any bad faults, and the low producers also. With the background of information now available, a much more accurate decision can be made and steady progress has been achieved. The basic aim is for a flock of medium-wooled ewes of 48 to 50 count. Care will have to be exercised with this slight swing towards finer wool to avoid losing weight by selecting the very stylish wool which is of a shorter staple.

HILL PERFORMANCE

At this stage, it was felt that a section of the flock should be run on the hill country to assess its ability to perform under such conditions while being completely unshepherded; and, also, to develop a strain capable of good performance in these circumstances, even at the expense of appearance if necessary.

The first ewes to be put in this group were not selected in any way; they were a straight run-off from the stud flock of 208 ewes aged two-tooth to four years. Sorting, tupping and the twice-a-year shearing are done on the flats owing to paddocking, and because the wool shed is on the main farm. All those ewes rearing lambs are retained in this hill flock and added to by the annual influx of two-tooths, most of which have been hill bred, but also with suitable type ewes from the main flock. The numbers of the hill flock have been lifted to 350 gradually to give a larger scope for genetic improvement.

Total accumulated figures for the four years are as follows: 1,068 ewes produced 1,064 lambs docked or about 100%; dry-dry ewes numbered 37 or 3.5%, wet-dry ewes 174 or 16.3%, and dead ewes 40 or about 4%.

During the time this flock has been in operation, it has been again evident that the wedgey-shaped ewe has been a superior performer, and it is noticeable that the flat-shouldered, heavy-fronted sheep has not been able to stand the pace.

When a flock is intensively shepherded for a number of years, it is inevitable that a certain percentage of sheep must carry genes for a less robust, and less vigorous stamina, than would be desired. It is not sufficient merely to have a ewe capable of conceiving twins; she must be able to deliver them quickly and effortlessly so that she is on her feet again and the lambs in good shape to be up and battling for a feed from an udder well shaped, with sufficient milk for their needs, and with teats which protrude at the right angle so that they can be quickly found by the lamb. These are mostly unseen qualities, but very important ones which have a big influence when a farmer calculates his profit or loss for the year. It has been to try to get some line on the survivability and general efficiency of sires and their progeny that we have run out figures on each, covering: number of ewes to sire; percentages of ewes tupped; ewes returned; dry-dry ewes; wet-dry ewes; live lambs; and dead lambs.

FACE COVER

We would like to see our sheep clear faced. A sheep which cannot see must be at a distinct disadvantage when grazing, quite apart from the difficulty the unfortunate musterer has when working in rough country. But breeding for clear faces has not been so simple. Almost clear 20 years ago, the sheep quickly acquired a medium

covering with the use of stronger-headed sires, most of which had moderate covering themselves. The use of reasonably open-faced sires since has had little effect in making them clearer, as they in turn have come from flocks with a face cover similar to or more pronounced than that of our own. The only solution has been to work on this factor within the flock, where a record of it is now kept. One of the major difficulties has been that the better wool strains seem to have had more face cover also. At second shearing, the 2-tooth ewes are given a face cover rating: 1 for clear face; 2 for medium covering; 3 for woolly head.

It has been interesting to note that those ewes with a rating of 1 and 2 have, at the second shearing, averaged 6.9 lb of wool per head and those rated 3 have clipped 7 lb, only 0.1 lb more. There seems little difference in the lamb production of the different groups when lambed on the flats, but there is an indication that the clearer-faced ewe has an advantage on the hills even though they have all been shorn.

This year, the five-year ewes were sorted into groups based on their lifetime lamb production. The results are presented in Table 1.

The ewes which were successful in completing four lambings in the unshepherded flock had less face cover by nearly half a score, the average being on the clear side of medium. These ewes, it will be remembered, were from the original mob to go on to the hills, and were not selec-

TABLE 1: COMPARISON OF FIVE-YEAR-OLD EWES GROUPED ACCORDING TO THEIR LIFETIME LAMB PRODUCTION

Measurements taken at two-tooth second shearing

Ewes' Lifetime Production	*Dams' Average Lifetime Production (%)*	*Bodyweight (lb)*	*Wool Weight 2nd Shear (lb)*	*Style Average*	*Face Cover Average*
100%⎫ lambed	143	119	7.4	3.65	2.28
200%⎭ on flats	160	123	7.7	3.52	2.28
165%⎫ lambed on hills in	144	128	7.8	3.55	1.83
100%⎭ unshepherded flock	139	119	7.8	3.3	1.8

ted for that particular role. It must be concluded that the more woolly-faced sheep of the original group dropped out over the years. The other main points of interest in these figures are that those ewes with good lifetime production have come from dams of superior performance, and that the good performer has been a slightly heavier animal. The wool weight and style have been very similar except for those ewes producing 100% on the flats; their wool weight was about 0.4 lb lower than the others.

A noticeable change has taken place in the temperament, from a lazy type ten years ago, to a much more alert and active sheep today. This has come about without being consciously selected for, and can only be regarded as a by-product of higher fertility.

REPLACEMENTS

The impression may have been gained that culling and selection is entirely conducted on figures and little attention is paid to the general standard. This, of course, is far from the case. The level of culling which takes place when the replacements are chosen determines the general standard of any flock. Our policy has been to cull everything which is not a good sound sheep regardless of fertility. Of the two-tooth ewes, about 20% are removed on the grounds of general conformation. The rest are subjected to a wool appraisal as a result of which 12 to 15% are culled. This is followed by another run through, taking conformation, wool and fertility into consideration, till the desired number of replacements are left. The percentage of two-tooths retained for replacements has varied between 48 and 60%. In the older age groups, the culling is mainly on performance. This year, it was decided to cull six-tooths with three singles, as by this age it was felt they should have been able to produce twins and that their place was better filled by a two-tooth.

Sire selection is more time consuming. After those rams with a satisfactory conformation and fertility background have been sorted out, they are further whittled down in number by the use of the records of sire and dam performance in fertility, vigour and wool, always bearing in mind that an alert and active sheep is required.

The question is: "Has all this procedure made the flock any more productive?" The answer is yes. A gap of 1 lb of wool per head has opened up between the stud flock and flock two-tooth ewes in favour of the studs since

wool improvement was started in 1962. The lambing percentage in the ewes lambed on the flats remains about the same, between 125 and 130%. They used to spend the whole time on the flats, be well flushed prior to tupping, and shepherded at lambing in small mobs in sheltered paddocks with attention at night. They now have at least four months of the year on the hills, have little or no flushing owing to increased stock numbers, and are spread out during lambing and shepherded during the day only. Had all these factors remained unchanged, an improvement would have been more apparent. However, one indication worth mention is the gap which has opened up between those two-tooth ewes sired by our own rams and those by outside rams. This difference is shown in Table 2.

TABLE 2: COMPARISON OF TWO-TOOTH EWE PRODUCTION BETWEEN THOSE SIRED BY HOME-BRED AND OUTSIDE RAMS

	Home-bred Sires				*Outside Sires*			
	No. Ewes	*No. Lambs*	*%*	*No. Sires*	*No. Ewes*	*No. Lambs*	*%*	*No. Sires*
1960, 61	386	366	94.8	20	211	199	93.8	17
1962, 63	523	540	103	21	150	151	100	16
1964, 65	630	671	106.5	21	144	133	92	10
	1539			61	505			43

It would appear that some years of intensive selection for fertility are required before sufficient depth of background has been built up to force it to the surface in the form of a greater lamb drop. We hope we are at this stage now.

The train of events outlined in this paper have been very much a case of trial and error, which, if attempted again now, could, I am sure, be condensed into less than half the time, by using the knowledge made available by many dedicated research workers, and particularly those of the Romney Survey.

The future holds a great challenge for the breeder. The farming industry is feeling the cool winds of recession while the farmer himself is fast changing from a traditionalist to a hard-headed businessman who is demanding results. In these circumstances, an approach to breeding which emphasizes production is of vital importance.

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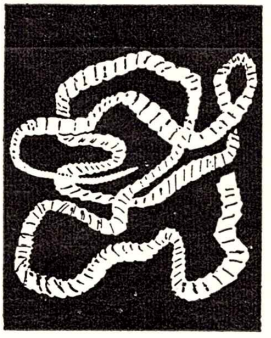

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CEREAL GROWING IN THE NORTH ISLAND PROBLEMS AND PROSPECTS

J. M. McEwan*

INTRODUCTION

It is the intention of this review to consider the potential for cereal growing in the North Island in the light of present-day knowledge and materials, and also to speculate on the extent to which this potential may be realized in the future by offsetting some of the problems of production. Only wheat and barley will be discussed, maize and other grain crops falling outside the scope of this survey.

Historically the North Island has been an important area of cereal production; in the late 1880s, for example, in the vicinity of 40,000 acres were sown to wheat alone. Of this total, rather more than half was grown in the Wellington Province and Hawke's Bay, where cereal crops are still to be found, the remainder being in the Auckland Province, Poverty Bay and Taranaki, where wheat production is no longer undertaken. From this peak, the level of production gradually declined to about 3,000 acres in the 1920s with an increased reliance on grassland farming. Several factors were important here, notably the relatively high cost of production in cereal cropping, the development of improved pasture management, and fertilizer application which made higher stocking rates possible and pastoral farming more profitable. The fact that cereal cropping could be carried out efficiently in Canterbury and with increasingly effective transport ensured that the North Island's requirement for cereal products would be met.

In the post-war years, cereal cropping showed a gradual resurgence. This was assisted by the availability of more suitable varieties and a move towards diversification of agricultural production. By the mid-1960s, the wheat acreage had reached about 13,000 acres. During the past year, with a substantial reduction in returns from other farm products and the long-term prospects for these commodities looking somewhat bleak, cereal cropping has had a dramatic return to popularity and fields of golden grain have once more become an attractive feature of the countryside in the late summer.

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THE POTENTIAL FOR CEREAL PRODUCTION IN THE NORTH ISLAND

A recent estimate of the potential for wheat production throughout the North Island has been made, with the suitability of the land and the climate of the various areas being considered in relation to the requirements of this crop. For satisfactory production of wheat, the land should be flat or rolling, with good natural fertility and good drainage, either natural or by tile drains. Climatic requirements of the crop are generally met by North Island conditions, though excess rainfall may bring with it problems of crop diseases, difficult harvesting conditions and sprouting of the grain.

It has been estimated that in the vicinity of half-a-million acres of suitable land exists which could sustain an annual wheat area of 100,000 acres. Of this, the majority (over 60%) is in Hawke's Bay, the remainder is divided between the Manawatu, Wairarapa and Rangitikei areas. For barley, which as a crop is less demanding in its requirements, the possibilities are greater, for, in addition to its suitability to the regions which will grow wheat, barley could be effectively grown in the Waikato, Bay of Plenty and Poverty Bay.

THE DEMAND FOR GRAIN AND GRAIN PRODUCTS

Any suggestion of increased production of cereals presupposes that an unsatisfied demand for this grain exists. In the case of wheat, the country's annual requirement has not been met by local production for many years, the deficit being made up by the importation of Australian wheat. Government policy has been to move towards self-sufficiency in wheat production but this goal has not yet been achieved. Should the increased production of wheat be in the South Island, the problem of redistribution of wheat within the country from the point of production to the areas of greatest consumption (centred in the North Island) becomes a costly one. An increase of production of wheat in the North Island is the logical solution, as it seems assured that milling grade wheat produced in the North Island will maintain a ready sale. Should surpluses of this grain accumulate in the future, owing to over-production in favourable years, some limited export is possible if the quality and the price are right.

In the case of barley, almost all the grain produced here is used for stock feed; there seems little prospect of the

development in the future of a malting industry for North Island barley. The potential of barley meal as a feed for poultry and pigs, and also as a dietary supplement for other stock is a considerable one and again some export possibilities exist if supply exceeds local demand.

INCENTIVES FOR INCREASED PRODUCTION

Basically, any increase in production of cereal crops will be tied to economic conditions, *i.e.*, the profitability of cereal cropping in relation to the returns for other farming enterprises. It is apparent that increased interest in cereal cropping is due to diminished returns from sheep raising and while this situation persists cereal cropping will remain attractive. Any future developments which will give higher or more consistent yields, such as improved varieties or improved disease control, will make the margin of profitability greater. For wheat, the premium of 20c per bushel on wheat grown in the North Island recognizes the desirability of producing wheat closer to the areas of greatest requirement. In addition, the storage of wheat on the farm to qualify for storage increments is a further means of increasing the profitability of wheat production. In the case of barley, which is sold on the open market, the price is determined by supply and demand, and the financial returns are not quite as predictable as for wheat.

There are also a number of more indirect advantages associated with the incorporation of a cycle of cereal cropping into a farm rotation. It enables the farmer to profit from the fertility of the soil which has been built up by the high stocking rates made possible by improved pasture species and pasture management. It also enables the renovation of pastures which may have been invaded by weed species, or insect pests, such as porina or grass grub, to be accomplished with profit and allows advantage to be taken of the recently-produced pasture varieties when the paddocks are sown down again after the crop.

PROBLEMS RELATED TO CEREAL PRODUCTION

Cereal production has always been fraught with some difficulties in the North Island; some of these have been overcome, others persist. Wheat yields in the North Island have, in past years, shown a similarity with average yields obtained in Canterbury, which are somewhat below the national average. Relatively high yields are obtained

in Southland, where, as in the North Island, the wheat is spring-sown but where there is less disease limitation. Any increase in the yield level or consistency of yield of North Island wheats is bound to have a stimulatory influence on production. To obtain the maximum price all wheat must have a satisfactory level of milling and baking quality, and, in general, the quality characteristics of North Island crops have been satisfactory in the varieties currently available. Quality levels may be eroded, however, by heat damage resulting from injudicious artificial drying of the grain or by bug-damage or by sprouting in the field. Agronomic characteristics are important, particularly for combine harvesting where lodging resistant varieties are highly desirable. Diseases may also play an important role in yield reduction; barley yellow dwarf virus, the virus disease transmitted by aphids, seems to take some toll of crop yields year in, year out, and in years when stem rust is epidemic on wheat, serious losses may be expected. Similarly, the minor diseases such as leaf rust, mildew, loose smut and root-rots have significant effects in reducing the ultimate yield. On a brighter note, however, the aspect of weed control is well looked after now with the advent of chemical herbicides.

In barley, though the yielding ability of present-day varieties is good and grain quality for feed purposes is not yet a major factor, the ultimate return to the farmer may be diminished by agronomic faults such as lodging susceptibility and second growth. Serious diseases do not menace barley to the same extent as they do wheat, but losses are certainly suffered from barley yellow dwarf virus, leaf rust and mildew.

All the problems of North Island cereal production so far outlined are the result of the interaction of the crop with its environment. If this interaction, either directly or indirectly, has an adverse effect on the yield or quality of the crop, the profitability of the crop is reduced. There are, however, a number of hazards to successful cereal production from another source—the manner in which the farmer handles his crop. Much of the "know-how" required for profitable cropping is obtained only by experience and mistakes may prove costly. Obviously, no amount of fertilization or spraying will redeem a crop which germinated poorly owing to inadequate seedbed preparation. In addition, there are problems inherent in the initiation of large-scale cereal cropping in areas where it has not been practised before. There would very likely be a shortage of necessary

equipment, contracting services and storage facilities. It seems probable, though, that most of the increase of cereal cropping in the future will be an extension of production in areas where crops are already being grown.

CEREAL VARIETIES, PRESENT AND FUTURE

It is undoubtedly true that the success or failure of cropping depends on the varieties which the farmer has at his disposal. Ill-adapted varieties spell doom for the crop. The wheat varieties at present available to North Island farmers can be placed in two general categories:

(1) Varieties bred at the Crop Research Division, Lincoln, for South Island conditions.
(2) Varieties introduced from Australia.

It is a tribute to the inherent adaptability of both these groups of varieties that they can be grown successfully in the North Island.

Of the characteristically South Island varieties, the most noteworthy are Aotea and Hilgendorf–61, both of which can be grown successfully, particularly in Hawke's Bay. As they were bred particularly for autumn sowing, these wheat are late in maturing when spring sown and this is a serious hazard in seasons when disease is rampant. Under suitable conditions, and when early sown, these varieties are capable of giving high yields. The quality of Aotea is satisfactory and the notably high baking quality of Hilgendorf–61 is recognized by a 20c per bushel premium paid for this variety. It also has very good resistance to pre-harvest sprouting, but Aotea is sprouting susceptible.

As fungal diseases of wheat are not a serious problem in the South Island, these varieties are quite susceptible to stem rust and other leaf diseases which may result in substantial yield losses.

By comparison, the Australian varieties, as exemplified by Gabo, Mengavi, Gamenya and Mendos, all of which are closely related, and the more recent introductions, Raven and Triple Dirk, which are also closely related to each other, are characterized by early maturity. As a consequence, they do well when sown in September, which seems to be the most suitable sowing time for most North Island areas. All these varieties have good yield potential, Gamenya and Raven being perhaps the best, and their quality characteristics make them suitable for bread baking. These varieties are well adapted to header harvesting, though Raven and Triple Dirk are taller than

the rest. At the time of their release, all these varieties were resistant to the predominant races of leaf and stem rust, but genetical changes in these diseases have led to the evolution of new races capable of attacking the previously resistant varieties in almost every case. These varieties, then, are no longer immune to these serious diseases, though their early maturity often helps them to escape from heavy infection. All Australian varieties, being white-grained, are susceptible to pre-harvest sprouting with the consequent loss of quality that this entails.

The situation with regard to barley varieties for the North Island is more clearcut, with a single variety, Carlsberg, being pre-eminent. It is well adapted to the conditions and can give high yields, but a weakness in the straw and a tendency towards second growth can make this variety a problem to harvest successfully. Susceptibility to infection with mildew and leaf rust is also evident.

In summary, the overall picture for North Island cereal varieties is that, though the varieties currently available are suitable for the conditions, they all have specific weaknesses which can reduce their level of profitability. The offsetting of these limiting factors by the production and release of improved varieties is a potent means of making cereal cropping more attractive to farmers. To achieve this end, a substation of the Crop Research Division, D.S.I.R., was set up at Palmerston North in 1966 to undertake the breeding of cereal varieties specifically adapted to North Island conditions. In general terms, the objectives of this breeding work are to improve the level of yielding ability and consistency of performance of the varieties allied with satisfactory quality characteristics, good agronomic type, more lasting disease resistance, and, for wheat specifically, resistance to pre-harvest sprouting.

The preliminary stages of this work are now well under way, but, of course, it will still be some time before any lines have been tested adequately enough to be released for commercial production. In the short term, a continued policy of introducing and testing improved varieties available from overseas in the co-operative field trials remains the best method of providing the cereal farmers of the North Island with better grains.

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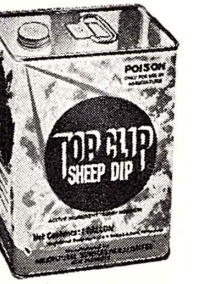

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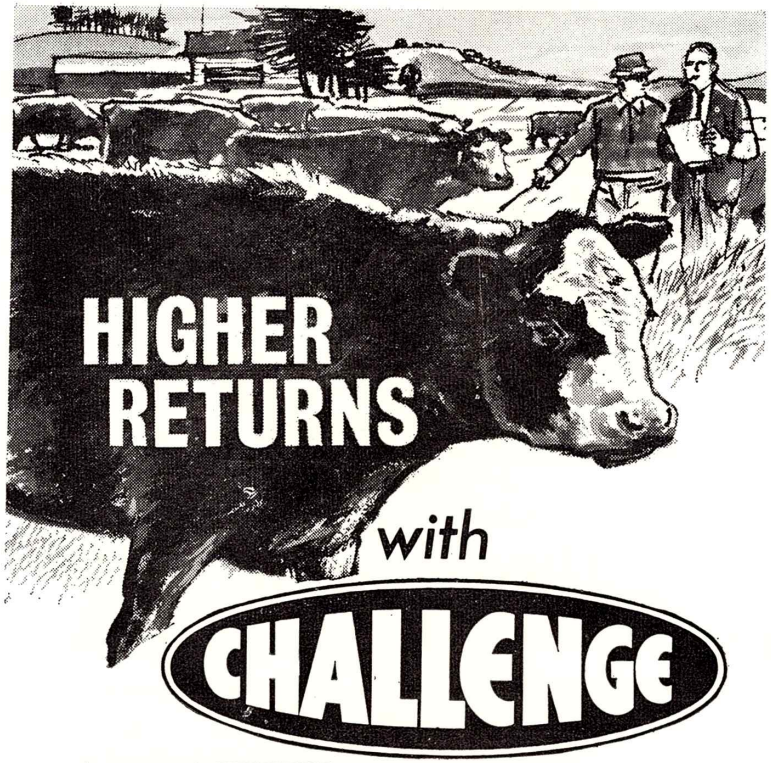

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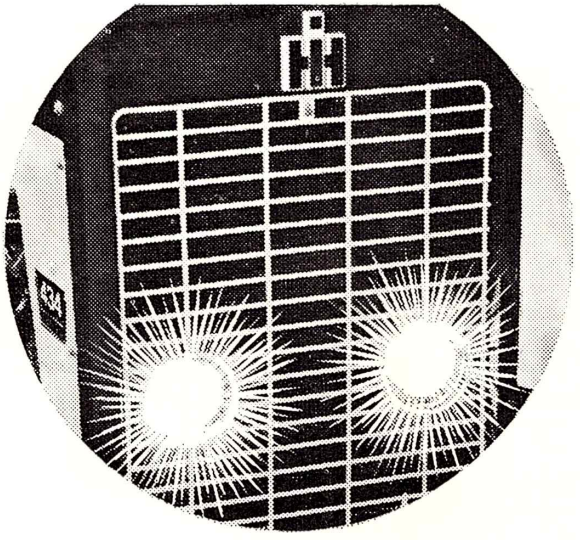

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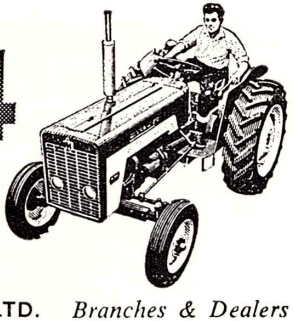

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Panel Discussion

ANSWERS AND ATTITUDES TO CURRENT FARMING PROBLEMS

A panel comprising three young farmers, F. C. GRAHAM, Turangi, D. M. LAND, Opapa, and J. D. MCDOUGALL, Martinborough, answered four questions posed by P. A. MACGILLIVRAY, Massey University.

QUESTION ONE

As a progressive sheep farmer, what steps would you take to ensure maximum financial returns from wool now and in the future?

MR LAND

I would take an active interest in the marketing of my wool. I would endeavour to ensure that the maximum number of consumers had access to my product. There are big takeover bids in the textile industry overseas, both in manufacturing and retail. If the producers of synthetic fibres control sufficient of the manufacturing and retail business, they will deny access of our product, wool, to the consumer. The Wool Board is not facing up to this danger and something must be done to ensure the long-term demand for wool. I am concerned that there is nothing in the Wool Marketing Study Group's Report to indicate this real danger.

MR GRAHAM

First, I would ensure by the means within my control that the product which I had for sale was of the best quality and offered in the best possible condition.

To do this, I would pay special attention when selecting my rams to choose sires with the particular type of wool which suited my country. I would not be tempted to follow the market and select for fine or coarse wool according to the current whim of fashion. I would try to keep my flock reasonably young so that the stresses which affect older ewes would not show up in their fleeces. I would pay particular attention to the nutrition of the ewe, trying not to feed her too well in early pregnancy, but con-

serving pasture to feed her well later on. In sheep management, I feel it is important to know when to ration sheep in order to save feed for a subsequent, more important, period, that is, to know when *not* to feed sheep well.

In selling wool, up to now, it has not always paid the farmer to heed the advice to handle and sort his wool well. Especially has this been so with the medium and poorer types of wool. However, in future, in our own interests as producers, we must take notice of some of the recommendations of the Wool Marketing Study Group's Report to implement a badly-needed wool appraisal scheme run by a central authority. This should ensure for the individual farmer an appropriate premium for good wool, well presented, and similarly, a discount for poor wool. Finally, as a prudent farm manager, knowing that, on current prices and trends, wool takes a second place to meat, I must emphasize each product according to its profitability.

MR MCDOUGALL

If my one aim was to get a bigger wool cheque, I would sell my crossbred ewes, sell my cattle, cease cash cropping, buy Merino and Corriedale four-tooth wethers and treat them for footrot three times a week, if necessary. My point is this—what are we prepared to sacrifice to get this bigger wool cheque? With the Colbred ewe, for example, because of its ability to rear more and better lambs, the proportion of total profit derived from wool has dropped to less than 10%. In the past fourteen years on my farm, sheep numbers have more than doubled, while cattle numbers have remained static. During this period, the proportion of total livestock income due to wool has dropped from 56% in the years ending 1954-55-56 to 37½% for the years ending 1965-66-67. On present outlook, the net return per ewe from wool, after deducting 60 cents for the direct costs of shearing, crutching, dagging, and interest and depreciation on woolshed and plant, is approximately $1.50. The net return per ewe from lamb is approximately $4.50. So that if we could breed a sheep without wool and all its attendant costs, we could break even by raising our lambing percentage by one-third. At the moment, the Southdown breeder does not give wool very much consideration and I doubt if the lamb producers of the future will. However, in a three- or four-tier breeding system, there is probably a place for the man who will be selecting almost exclusively

for wool, but he will have to be able to produce a top grade article with a very low labour and capital input.

What are we doing about this ourselves at present? We are culling for wool quality on the sheep's back at the two-tooth stage after being shown what to look for by the Department of Agriculture wool instructor. We are also culling for wool weight at the two-tooth stage. We have found that one man walking on a plank nailed over the counting-out pens, armed with a 10 ft stick with a bag of crushed raddle on the end, can easily keep up with five shearers. He receives instructions, by means of walkie-talkie radio, from the man at the scales weighing each fleece, and marks each sheep to indicate whether it will be retained for breeding or culled. I think coloured lights, either mains or dry-battery operated, would be a cheaper and more effective means of communication. I like the idea of weighing the fleece because, in a multi-purpose breed, wool weight gives a good indication of the animal's constitution and suitability to its environment and nutritional level. We mate hoggets and this complicates the issue. We shear those which have not lambed (drys) separately from those which have lambed as hoggets (wets). We aim to cull twice the proportion of "drys" as "wets".

Question from the Floor

In order to compete on a more satisfactory basis with synthetics, would it pay to manufacture wool into tops in New Zealand?

MR LAND

This is already being done to a limited extent. Taking wool to a further stage in the manufacturing process, although of immediate return to the nation, may not, except in the long run, be of benefit to the grower. There are farmers' concerns in this country which have been retailing wool successfully for thirty years.

Question from the Floor

Until the market is prepared to pay for good preparation of wool, is it a waste of time to prepare it well?

MR GRAHAM

At present—yes. Only if one has a particularly good type of wool is there any premium, in my opinion, to be obtained by sorting it.

Question from the Floor

Should there be a premium for good wool and why is it not in evidence in prices at present?

MR GRAHAM

Yes, there should be a premium for good wool properly sorted and classified. Our competitors selling synthetics have a well-prepared and classified product with a definite ceiling price. If we cannot provide an adequate product to compete at about the same price, then we must expect trouble. I feel many potential customers are not competing for wool because they can get better-prepared and classified synthetics.

QUESTION TWO

If you intended to increase stock numbers, which would you choose, cattle or sheep, and why?

MR MCDOUGALL

Some factors which have to be considered initially are land fertility, topography, water supply, drainage, access and area or scale, climate and rainfall, labour supply and availability, liquidity and financial resources. Profitability, both now and in the future, has to be assessed, as too do the effects of the extra stock on the profitability of the stock already held. In general, I believe that large-scale farming, particularly in remote areas, favours cattle. If an increase in sheep numbers means employing extra labour then cattle might be attractive. At today's price and wage levels, you have to carry an extra 800 ewes to break even if you propose to employ and house an additional adult. If you are increasing your stock numbers, it is an odds on bet that your liquidity is sick. This makes sheep attractive because the capital input of cattle is three times higher than that of sheep. Because of this, we, at present, are rearing dairy heifers on a contract basis. This beats the capital problem with no loss of profit. Rearing dairy beef from the bobby calf stage also appeals to me, as this achieves the same objective. For simplicity, rather than practicability, we have prepared budgets comparing "all sheep" with "all cattle" at different levels of profit. The picture that emerges is that, at last winter's stocking rate of 4½ ewe equivalents per acre, conversion to an all cattle policy would raise the net profit of the farm by 41%, but the total capital required as a going concern would rise by 40%. This pro-

jection is based on a gross profit per sheep wintered of $6 and a gross profit per cattle beast wintered of $30. The farm capital is based on sheep being worth $5 and cattle $60. Unfortunately, there is another side to the ledger. The total cost, including manure, fencing, water and capital stock, of increasing our stocking rate from 4½ to 5½ ewe equivalents, taking up the whole increase with sheep, is less than half as high as converting to an all cattle policy at the present stocking rate. In addition, at this stage, *i.e.*, at the 5½ ewe equivalent level, the profit, expressed as a percentage on capital, is higher with sheep than with an all cattle policy at lower stocking rates. The higher stocking rate seems to be the key to it. Having considered these things, we are trying to reach the optimum stocking rate as quickly and as cheaply as possible. This means that all extra stock put on will be sheep or dairy heifers on contract. When the optimum stocking rate is reached, we will start replacing sheep with cattle, and, in the process, expect to lift the returns per head of the sheep.

The recently released FAO estimate of a 600,000 ton annual deficiency in beef requirements by 1975 could make cattle a fairly good bet. However, this amount is a small proportion of the total world trade in beef.

MR GRAHAM

My comments relate to a hypothetical farm carrying 1,800 ewes and 110 breeding cows. Stock numbers would, of course, be increased only if additional stock were likely to be profitable, or beneficial to the farm. Existing feed would have to be better utilized, or more feed grown. I believe there is a definite conflict between sheep and cattle at high stocking rates. Increased sheep numbers lead to reduced performance in cattle, and, perhaps, reduce the existing performance of sheep.

There is a property close to mine, running 9½ ewe equivalents, on which ewe numbers were reduced recently by 200, and cattle increased by an equivalent number. In the same year, they had more than 200 extra lambs, and seven bales more wool off the property. There was no argument about the benefit of reduced sheep numbers in those circumstances, and the cattle came through well. The future market outlook would appear to favour beef and I think this reinforces the decision, but I would hesitate in allowing it to influence the decision too much.

There are disadvantages to increasing sheep numbers, especially in view of farming trends during recent years. On many properties further increases in sheep numbers accentuate the problems associated with inadequate culling. Some criticisms of the quality of wool over the past few years bear this out. Any increase in sheep numbers would normally increase the proportion of high-care sheep, including hoggets and fat lambs, sheep that require extra attention, and sheep which suffer when a food shortage occurs. I feel that proper selection for better sheep performance and breeding from ewe hoggets may be more successful than just increasing numbers. Cattle, on the other hand, might be increased with little extra labour, or little adverse effect on the performance of sheep.

Assuming that I decided to increase cattle numbers, what policy would I choose? In addition to breeding cows, there are two main alternatives. The first is to buy weaners and finish them at 20 months of age. Department of Agriculture figures show that under semi-intensive management, this is likely to give better returns than the breeding ewe proposition. On my hypothetical farm, I would suggest that, instead of selling the top weaner steers, they be carried through to 20 months of age and sold fat. However, this could be done only if the country permitted good wintering of weaners. Indications are that weaners which have done poorly from 6 to 12 months of age can take 10 to 20 weeks longer to finish. This can be vital if there is a cold winter following. The second alternative is to buy 20-month-old steers in July and aim to sell them in April/May of the following year. On present prices, one could budget on $60 purchase price and $100 sale price, *i.e.*, a return comparable with that of breeding cows. There is only one mouth to feed during the summer, not two, there is the advantage of compensatory growth in a 20-month beast being better than in a weaner, and, should feed conditions deteriorate, I think the older animal withstands these better than the younger.

To ensure the best weight gains, and to avoid running into excessive fat problems, I would buy Friesian cross steers, and, if I could not obtain them, I would be tempted to breed my own. I would prefer Friesians, especially if buying 20-month-old cattle, because they would have less fat by the time they were finished, thus giving the advantage of better yield (this is on the assumption that yield grading will be introduced shortly). I would spray, drench and weigh them regularly.

The 20-month steer purchase has an additional advantage for many farmers—they are not faced with the June 30 overdraft problem. These animals are bought in July, they are sold in May, and one can look the bank manager in the face on June 30.

To achieve these objectives requires good cattle husbandry. This is one aspect that has been sadly neglected in this country. A fair amount is known about the technical problems of high stocking with sheep, but little about the technical problems of high stocking with cattle. I am experimenting with a tentative policy of keeping cattle away from the sheep as much as possible, in the belief that we can handle most of our summer growth problems with sheep if there are enough of them. During the summer months it is intended to concentrate the ewes on one third of the farm; the lambs are set-stocked on a second third, and the cattle are rotated on the remaining third. Should the pasture growth on any one section get out of hand, the size of that section will be adjusted. In this way, cattle are being farmed for profit, not as mowing machines, and I think this is probably the biggest mental block we have to overcome.

MR LAND

If I were making any increase in stock numbers, I would tend to increase with both cattle and sheep because I think one gets maximum utilization of pasture by having both types of animal.

QUESTION THREE

What do you think are the most important points in making the best use of labour on a sheep farm?

MR LAND

I suppose the ways of making the best use of anything are sound management principles. There are several things that can be done to obtain better utilization of labour. A labour budget is important. By this I mean the planning of work throughout the year so that the more important things are done first with the labour available. If it is a large property, a decision can then be made as to what work will need to be done by contract. Alternatively, if you are restricted with labour, or trying to economize, it may be possible to delay unproductive work until such time as it could, perhaps, be done under taxation exemption.

A large unit, by specialization, can usually utilize labour better than a small farm. The smaller unit can possibly overcome this problem by using contractors for specialized work. While this is likely to be expensive, it may, in some cases, prove less expensive than employing full-time labour. Good grazing management helps with labour-saving in shepherding; it also helps the health of the stock and gives more control over stock.

To attract and keep good labour, you have to offer good housing and facilities. Staff training is also important. Federated Farmers are having a close look at this throughout the country. Another important aspect concerning labour is the number of white elephants run in this country by other types of industry. This affects the labour position on farms by forcing up the price of labour. I am not criticizing the wages paid to these people, but, unfortunately, uneconomic industries tend to raise the whole cost structure, which means that labour units have to have higher wages to be able to pay their way, and this reflects back on the farming industry. It would be far better for everyone concerned, including employees, if every industry in this country had to face world markets. It has been estimated that in New Zealand the rural worker earns three times as much export income as the urban worker.

Mechanization is also important—tractors and machinery save time. In our own case, for example, where it used to take one man three to four weeks to clean all the open drains on the property, they can now be done more easily in two days with a tractor. Similarly, motor cycles can improve the efficiency of labour on many farms. They save time if they are properly equipped with the right tyres (which of course are not obtainable!) and with low reduction gear boxes. There are innovations coming into farming such as deep pits or burning devices for getting rid of carcasses, rather than the shepherd carrying a spade round and digging holes which later subside and may break the axles of vehicles on flat paddocks. More fencing, tracks and other facilities such as well-designed yards with races, where dagging and other work can be done rapidly, improve the efficiency of labour.

MR GRAHAM

My first consideration is what is meant by labour. I have taken a slightly broader view in that I have regarded

labour not only as the labour that I employ, but the labour that the farm employs, starting with the most important labour unit, the farmer himself. He is responsible for the day-to-day management, he is responsible for the hiring of experts, and this, I feel, is his most critical job and possibly one that many of us often neglect. The second most important unit of labour on my farm is my accountant, and, if he could not tell me what I wanted to know, I would replace him and find one that could. The third most important member is my advisory officer, and, again, if he could not tell me what I wanted to know, or made too many mistakes, I would find another. In general, I feel that one stockman for every 2,000 ewes is sufficient. In most cases, one farmer, if his health and his management are sound, and his property is not particularly difficult to handle, should be able to run 2,000 ewes under today's conditions.

The farmer must expect the labour he employs to be good labour. There has been a feeling in New Zealand for many years that if you are a farmer you are just a little bit better than the fellow who is regarded as a second-class citizen, working around. I think we must adjust to less labour than we have had in the past, but that this labour must be of a high standard, well trained, well rewarded and taking an equal part with the owner, the accountant, the adviser and others in the running of the farm. Labour is only one of a number of commodities used on a farm. Any farm is limited by its size, its finance, and its labour, and that includes the amount of brain power than can be put into it. To waste any of this is a serious management fault, in particular, to waste any available brain power. If planning is slack, everything is slack. Contractors need to be used more than they are at present. Not only do they use their machinery more economically, they can also use their labour more efficiently because they develop a team with the skills for a particular job. In this age of the specialist, it is becoming increasingly evident that we get more efficient work from an expert than from the general-purpose man.

Finally, we can adjust our policy in regard to easy-care ewes—Perendales—and we can put lanes for stock movement in good order. All these routine farm management policies should be part of overall planning. And, an important point, we should supply the labour for the job, not find jobs for the labour. It happens very often with full-time permanent labour that the farmer is kept busy

just finding jobs to keep them busy. There is a variety of skilled and unskilled labour available, but the most valuable labour is the farmer's own, and his most valuable time is spent in planning.

MR MCDOUGALL

There are two sides to this question, first, how many labour units are required and of what calibre, and, secondly, what are the main factors contributing to their or to your efficiency? What needs to be aimed for is the greatest margin between the total gross profit on the farm and the total labour costs, including housing and all the other concealed costs. The national average is one labour unit to approximately 750 ewe equivalents. I know of some cases doing better than one to 5,000. I am actually organizing a place of 3,000 ewes with no permanent labour at all, but an efficient farm advisory officer who employs casual or contract labour when need be. If the death rate and lambing percentage are acceptable on a sheep farm, it does not matter if there is only one labour unit to 10,000 ewes. These are the criteria to judge it by.

There are two attitudes. The first is: "Right, what do we do next?" The second, which I prefer, is: "Hang on a minute, what need *not* be done next?" It is vital that whoever is calling the shots on today's average-size sheep farm is of the highest calibre. If there is a 2½% increase in profitability on a farm worth $80,000, this is $2,000 a year. I would suggest that if most of us sacked ourselves and advertised the job at $2,000 a year more than we are drawing now, our farm account would benefit, even if we did not. If you can manage your farm without one of your offsiders for one year, this probably means you could have three sets of well-sited, permanent sheep yards, or a mile of laneway, or a mile and a half of metalled internal road all done on a contract basis. Similarly, instead of building a house for an extra employee, the same money spent on these improvements could mean that you do not need him anyway. You might have to consider employing casual labour, changing your breed perhaps, running more cattle, avoiding critical bottleneck periods of work when you just cannot manage.

There is only one house on our farm; we run a vehicle 11 miles from town each day to bring out 5 men. The farm is run as three units—two two-man units and one one-man unit—mainly because I believe that a two-man unit on a farm is the most efficient for many jobs, al-

though it does annoy me to see two men doing a job that one man could do. Shower dipping is an example of this. I have found my output to be only about fifty per hour slower than when one or even two extra men are on the job. It is very difficult to get anyone with a good brain to come and work on a farm unless you let him use it. If he is going to use his brain, it is essential to establish what you are aiming at, how you are planning to do it and make sure that everyone clearly understands. How many people work on farms without really having any idea what it is all about? A chart of the year's work programme, with all the relevant dates and times, is a big help. Also a farm plan. Both of these must be where everyone can see them. Mechanization has already been mentioned. Logistics is another thing. There must be the right number of men and the correct materials at the right price at the right place and at the right time. How many of us are experts at having three men trying to dig one hole with two shovels? If you have a new employee working for you, or possibly one who is not very intelligent and he makes a mistake, nine times out of ten it is your fault, because you should have taken this into account and made absolutely sure you got through to him exactly what you wanted done. If you have got a really bright worker, probably the best approach is just to say, "Well George, what will we do today?"

QUESTION FOUR

What major incentives or changes in the sheep-farming industry do you think are required, and how can they be brought about?

MR LAND

This is an important question, and I choose to discuss marketing. We have to improve the marketing of our meat and wool. We have to improve it because it is lagging behind the times. There is no doubt about this. Allowing for inflation and devaluation, we need nearly a 50% increase in the prices of our meat to equate prices received ten years ago. The marketing of meat, particularly, is more good luck than good management, and this was evident this year. We have had a fairly successful year, or more successful than anticipated, but we were most fortunate in the wake of Britain's misfortune. The disastrous foot and mouth epidemic there was a terrific boon

to the marketing of New Zealand lamb. We could have been in serious trouble if the Argentinian supplies of meat had been going on to that market. Again, it was our good fortune and Australia's misfortune to have one of the worst droughts on record in that country. They exported very little lamb from Australia last year, and, in the preceding year, there had been fierce competition on the Canadian market.

I am concerned with the marketing of meat because, when I heard the Meat Producers Board consultants address a meeting in March, and describe New Zealand's marketing methods in the United States as archaic, my hair stood on end—to realize that we were not cutting the meat in the acceptable manner, that we had not increased our sales of meat over the last five years in spite of spending more than $9 million in developing and subsidizing the United States market, was rather frightening. Now the opportunity is there. We have got to get out and supply the consumers in those markets with what they want. One of these consultants, Mrs Schurr, showed us on television what the consumer wanted. By supplying this highly-selective, but affluent customer with exactly what she wants, we could receive, or the retailer could receive, $1.29 extra on a leg of lamb. By supplying the meat cut and packed to customer requirement, at an additional cost of three to four cents a pound, we stand to make a very substantial profit. The present situation to me is ridiculous, and we should be doing something about it.

The same situation, or somewhat similar, applies on the Canadian market. They are not satisfied with our cutting methods. There was a group of Canadians in New Zealand in Februarv. They had a look at the freezing industry throughout the country. They were most impressed with the freezing works, they were impressed with the standards of hygiene, but they said that we did not know the first thing about cutting to their requirements. But in the preceding year, we spent $100,000 on promotion of lamb in Canada. The Australians did not spend anything; they sold as much lamb as we did—they sold theirs in cuts; we sold ours in carcass form.

We have been told that the poorer cuts will not sell. This is absolute rubbish. If these cuts are prepared the wav the customers want them, they will sell, and they will sell at a profit. We have been told that the smaller lambs will not sell on the American market. They can be sold, and it is vital that we get into this American

market. We have got until 1972. We have got a rapidly-increasing lamb kill. We should be conditioning and cutting as many lambs as possible, even for the British market. It has been stated that there is more New Zealand lamb sold in cuts on the British market than on the United States market. I understand that the development company in the States which is selling our lamb has made a change in its selling methods; it has taken a long time to do so. It has to make many more changes. We should have a substantial market there. There are 200 million customers in the United States alone. Not very much lamb needs to be sold to each customer to have a terrific sale. It is vital that we have millions of lambs on that market before 1972, so that we do not overload the British market. We will probably be faced with a tariff when the present agreement with the United Kingdom runs out in 1972. We could, by then, have consumer demand on the United States market if we had a substantial amount of lamb going in there now. This is the thing that has assured our entry into the British market—consumer demand. The politicians there want as cheap a food for the constituents as possible, and the same thing applies in America—and the same thing will apply in the E.E.C. We should have the markets established so that when we do have changes, such as Britain going into the E.E.C., there will be consumer demand pulling from the bottom of the ladder as well as government agreements at the top. Neither am I satisfied with the Wool Marketing Study Group's report. I think that the report is out of date, that we have to look at other aspects to assure our future for ourselves and for our children.

MR GRAHAM

I intended to discuss incentives until I heard D. N. R. Webb's address at this conference. According to him, there are 27% of farmers who are not interested in any incentives at all. I have got some cabbages growing in the garden, and you know what happens to them eventually—they sit there and they do not want any change either, but when it comes it is pretty violent!

When I looked at this question, I said, "Why am I farming, what am I trying to achieve?" I think the answer for most farmers would be primarily to attain a reasonable income, not only for now but for the future, and, secondly, to do a vital and rewarding job well and get some satisfaction out of it. These are the two things I

am aiming for and the greatest incentive I could have would be faith in the future to plan my operations along these lines. All the conventional, oft-mentioned incentives will have no effect if we have no faith in the future of the industry.

There are so many new, technical advances in farming that this should be one of the most exciting and stimulating times we could possibly live in. But I do not see much excitement or stimulation about at the moment. There has not been much enthusiasm since about 1964 when the Agricultural Development Conference gave the green light to go ahead. We produced the goods but, unfortunately, somebody forgot about planning for the aftermath. For example, the fact that there would be a lot of carcasses to sell, and that a lot of storage space would be needed, was forgotten.

I believe that the major incentive we can have is a constructive plan for the future. As I see it, the industry needs expert assessment of world market trends and trading changes, which no farmer is in a position to worry about. His job should be to farm as well as he possibly can. We should employ experts to find out what we are to produce. To do this requires leadership, and I am not attacking our present leaders. We have got many very able men among them. But I am attacking the apparent outlook. This is a plea for some urgency which is sadly lacking—a plea for a more dynamic approach that can be communicated to the farmer.

There are many competent men in the industry whose resources and abilities at the moment may be wasted. There are younger farmers, fellows who have got the drive of a decent sort of overdraft and a lot of ability. They have not got time to come up the slow way through Federated Farmers, yet they have ability and talents which should be used. I feel we badly need some forum, some seminar, some way of tapping the ability of these men who at present are doing a good job on their farms, but could also be contributing a great deal to the industry.

We must find out what we can sell and then follow up with a plan to produce it. We have heard a great deal about new markets for meat, diversifying to beef or grain, growing finer instead of coarser wool, but little is known with any certainty about the longer-term outlook for any of these prospects. Take beef, for example. Where is our market research group? What about such things as consumer preference, type of packaging, system of transport and storage, problems in maintaining continuity of

supply? I do not think that we have such an approach or such a group. Farmers cannot do this job themselves because they have neither the time nor the ability. There must be experts employed to find out about these things, and when they come up with the right answers they must be properly rewarded.

When we discover where the markets are, and have got them opened up, let us have a team of salesmen, not retired farmers, to get on with the job of selling our goods. I envisage in this dynamic set-up the development of supplying meat on contract. This involves the exporters who would each have an opportunity to take up some of the potential market, arranging for the farmer client to grow a specified type and quantity of product for this market at a pre-arranged price. If sales were up to expectations, then a premium would be paid to farmers, which would be an added incentive. Should the market prove larger or smaller than expected, differential rates for supplies outside the contract would apply. This means that I, as a grower, could plan to deliver the right sort of product consistently, at the right time, for a reasonable reward. This kind of organization would allow me to budget and plan ahead and provide a target (which I now lack) and confidence in the future.

MR MCDOUGALL

Incentives are used to stimulate any industry that is likely to prove of long-term benefit to the community. Does sheepfarming as such, fall into this category? I will assume the question refers to our average New Zealand sheep farm which produces mutton, beef, wool and other products. In an advanced nation, with its attendent high taxation level, I believe tax incentives are a potent force. The incentives I envisage would ensure that the recent production drive did not lose its steam and that it would be channelled in the right direction. I would like the total cost of all fertilizer on the ground to be claimable at somewhere between 120 and 140%. I would like to see any book profits created by the replacement of sheep and cattle made non-taxable. I think that the 150% export allowance that is now available to manufacturers should be extended to cover dairy beef and possibly other beef at a lower figure. I would like farm valuations for estate duty purposes to be made on unimproved value at a higher rate. This would stimulate reinvestment of profits back into the land.

Sheep are going to be with us for a long time, so let us do something about them. Let us try to make them more efficient. Our genetic pool in New Zealand is far too limited for a major sheepfarming nation. We should import and test, possibly under government supervision, any breeds that show promise. We should levy each sheep owner at the rate of 2 cents a sheep per annum. This would provide well over a million dollars additional money annually for research and development in the sheep industry in New Zealand.

We should set up, say, ten livestock testing stations throughout New Zealand, to which stud breeders could send animals for productive evaluation over a twelve-month period. When the results were published, they would stimulate demand for the good strains and accelerate progress. We should be prepared to contribute more, as farmers, towards the Meat and Wool Boards for research and new-product developments.

I have reservations on the promotion side. Between ½ and ¾ of 1%, about 0.6%, of our industry's gross production is spent on research and development. This compares with the synthetic manufacturers who are reputed to spend about 5%. The internal return on money spent on research and development is high. Case studies have been made in New Zealand of specific projects that have been tackled and the internal return has been higher than 20%.

There are many small and uneconomic sheep farms in New Zealand, and there is nothing surer than that there will be fewer and larger sheep farms in the future. I believe that it is not the industry you are in that counts, it is how good you are at the industry you are in, and I think we should get better at the one we are in. We have got to produce what the customer wants at the price he can pay, and we have got to gear our industry so that we can make a worthwhile profit while we are doing this. We are in danger of adopting the near disastrous attitude held by Henry Ford at one time—they can have any car they like so long as it is a Model T and so long as it is black. We are in the midst of a major breakthrough in the hill country now, regarding higher stocking rates. I think that the next big steps forwards we take will be in the field of management, labour utilization, and probably most important of all, genetic improvement.

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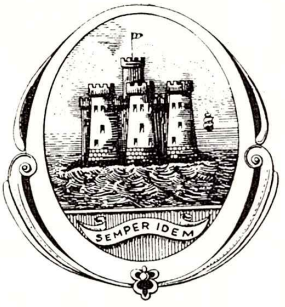

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2. The ungenerous
3. The unlucky

We can't keep you out of the third class. No-one can help the second class. But if you don't want to be classed with the first, why not consult us?

We have been planning farmers' estates since farmers' estates needed planning. You too can save yourself income tax and your family death duties. Call on our nearest branch now. Our Branch Managers are trained in estate planning. Our local Boards of Directors give you the benefit of intimate knowledge of farming conditions and sound advice.

THE TRUSTEES EXECUTORS AND AGENCY COMPANY OF NEW ZEALAND LIMITED

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